

Environmental Services - Delta Fish Agreement - Four Pumps

Delta Fish (Four Pumps) Agreement (Delta Pumping Plant Fish Protection Agreement)

The 1986 Delta Fish Agreement between the Department of Water Resources and the Department of Fish and Game provides for offsetting adverse fishery impacts caused by the diversion of water at the Harvey O. Banks Delta Pumping Plant, a key part of the [State Water Project](#) located at the head of the California Aqueduct. Direct losses of Chinook salmon, steelhead, and striped bass are offset or mitigated through the funding and implementation of fish mitigation projects. DWR and DFG work closely with the Fish Advisory Committee to implement the agreement and projects funded under the agreement. The Fish Advisory Committee is made up of representatives of the State Water Contractors, sport and commercial fishing groups, and environmental groups.



Robinson Reach, Merced River Salmon Habitat Enhancement Project

The Agreement

The agreement was signed by the Directors of DWR and DFG on December 30, 1986, and has been amended twice since that time. The Delta Pumping Plant Fish Protection (Delta Fish) Agreement is also commonly known as the Four Pumps Agreement because it was subsequently identified as mitigation for the enlargement of the Banks Pumping Plant, including four additional pumps.

- [The Agreement](#)
- [Revised Appendix A](#)
- [Amendment 1](#)
- [Amendment 2](#)
- [Amendment 3](#)
- [Article VII Agreement](#)

Projects

The Four Pumps Program has implemented a variety of projects in the Sacramento and San Joaquin river basins and in the Bay-Delta area, such as...

4spacer [more...](#)



Funding

An [Annual Expenditure Report](#) is presented to the Fish Advisory Committee after the calendar year ends. Mitigation fund expenditures through December 31, 2009, \$40.6 million for the Annual Mitigation Account and \$13.3 million for the \$15 Million Lump Sum Account. Funds approved but unexpended from each account were \$8.0 million and \$1.6 million, respectively. The remaining funds are allocated for new or longer-term projects.

DWR funds these projects through State Water Project Funds provided by the State Water Contractors in two accounts:

1. \$15 Million Lump Sum Account - No fish mitigation credits are associated with these projects.
2. Annual Mitigation Account - Fish mitigation credits from these projects offset or mitigate direct fish losses.

Project and Funding Partners

We also encourage and rely on cost share partners to help implement many projects. Our cost-share partners have included:

- DFG
- USBR-DFG Tracy Fish Mitigation Agreement
- CALFED Category III

- CALFED Ecosystem Restoration Program
- USFWS Anadromous Fish Restoration Program
- NOAA Fisheries
- Wildlife Conservation Board
- Robinson Cattle Company

Mitigation Status

The Four Pumps Agreement has been a very effective tool in mitigating direct impacts for the three species, and has offset over 100% of the mitigation losses as determined by DFG for salmon (188%) and steelhead (121%) and for striped bass (102%). Mitigation is on a fish-for-fish basis. The program is in a period of project maintenance and replacement as older projects end. Passage projects, migration flows, and enhanced enforcement for spring-run Chinook salmon continue to be priority projects, as do natural production projects for steelhead.

Annual Fish Loss and Credit Report

- [2009 SWP Mitigation Loss Calculation](#)
- [Annual Fish Mitigation Report](#)
- [Annual Striped Bass Credits](#)
- [Annual Salmon Credits](#)
- [Fish Loss and Credit Graphs](#)
- [June 2010 DFA Meeting Package](#)
- [Annual Expenditure Reports](#)

AGREEMENT BETWEEN
THE DEPARTMENT OF WATER RESOURCES ,
AND
THE DEPARTMENT OF FISH AND GAME
TO OFFSET DIRECT FISH LOSSES IN RELATION TO
THE HARVEY O. BANKS DELTA PUMPING PLANT

THIS AGREEMENT is entered into by and between the Department of Water Resources, hereinafter referred to as "Water Resources", and the Department of Fish and Game, hereinafter referred to as "Fish and Game", to offset direct losses of striped bass, chinook salmon and steelhead caused by the diversion of water by the Harvey O. Banks Delta Pumping Plant (Pumping Plant).

RECITALS

Water Resources and Fish and Game recognize:

A. Fish populations of the Sacramento-San Joaquin Delta (Delta), some of California's most valuable resources, are declining. Striped bass populations dependent upon the Delta have been declining since the 1960's. Today, California's native chinook salmon resource is extremely dependent upon the Sacramento River System. Fall runs of chinook salmon stocks in the Feather and the American Rivers are in good condition due to habitat maintenance, hatchery production, and stocking procedures. Other fall runs of chinook salmon in the Sacramento System have been depleted to varying degrees. Winter and spring runs of chinook salmon are severely depleted. Salmon stocks in the San Joaquin System are depleted more than stocks in the Sacramento River System. Steelhead stocks in the Sacramento

System are depressed. Other species of fish which are dependent upon the Delta have been adversely affected, but none of them appear to be endangered as a species.

B. Fish populations in the Delta are greatly influenced by a number of complex interactions, no one of which has been identified as the principal environmental factor. Delta inflow, water exports, power plants, consumptive uses, upstream and local diversions, tidal action, levee failures, pollution, agricultural return flows and recreational and commercial activities are all recognized factors that to varying degrees affect the fish resources of the Delta.

C. Overall fishery resources dependent upon the Delta have been adversely affected by impacts of flow distributions in the Delta caused by the State Water Resources Development System (which includes what is commonly called the State Water Project) and other water resource development projects. The State Water Project must mitigate for its impacts on fishery resources. This agreement covers only some of the impacts of the State Water Project.

D. The purpose of this agreement is to offset direct losses of some species of fish caused by the State Water Project Pumping Plant diversions. Direct losses are defined as losses of fish which occur from the time fish are drawn into Clifton Court Forebay until the surviving fish are returned to the Delta. These losses occur in spite of fish screens located at the Pumping Plant because of such things as enhanced predator

efficiency in parts of the system, very poor screening efficiency for fish less than about one inch long, and mortality caused by handling fish in the salvage process. Direct losses of fish have reduced the abundance of affected species. Since these species are less abundant, the direct losses of these species in any given year are now likely less than they would be if water diversions in previous years had not occurred. An attempt to take this factor into account was made in defining responsibilities under this agreement. The parties do not intend to cover in this agreement losses which occurred prior to 1986.

E. Other adverse fishery impacts related to State Water Project operations need to be addressed. The parties intend to begin discussions on developing ways to offset these impacts which are not covered in this agreement, including facilities needed to offset fishery impacts and provide more efficient conveyance of water. The parties intend to continue the process which led to this agreement. That process included an advisory committee of representatives from interest groups concerned with fish resources affected by the State Water Project including representatives of the State Water Project contractors. Additional measures for impacts not covered in this agreement will have to be included in proposals by Water Resources to expand its diversions beyond the limitations contained in this agreement and will be part of agreements between Fish and Game and Water Resources regarding such proposals. Until agreement is reached on such measures, the State Water Project will not

increase its diversions beyond those set forth in the U.S. Corps of Engineers Public Notice 5820A, amended, dated October 13, 1981 which limits exports to the amount of water that can be diverted by the existing pumps, except during winter months when additional amounts can be diverted during high San Joaquin River flow periods.

F. In principle, Fish and Game and Water Resources intend this agreement to offset direct losses of all fish caused by the diversions of water by the Pumping Plant starting in 1986. Presently however, information on impacts and measures to offset those impacts is sufficient only to deal with chinook salmon, steelhead and striped bass. Impacts on other species of fish will be addressed if impacts are identified and measures can be developed which would offset such impacts. Measures provided under this agreement may benefit other fish species.

G. It is the intention of Fish and Game and Water Resources to give priority to measures which are designed to protect or improve fish habitat and which would preserve the genetic diversity of fish stocks in preference to hatchery and stocking programs.

AGREEMENT

NOW THEREFORE, Water Resources and Fish and Game agree as follows:

I. Beginning in 1986, Water Resources will offset direct losses of striped bass, chinook salmon, and steelhead

caused by the diversion of water by the Pumping Plant in the following manner:

A. Direct losses of striped bass, steelhead and chinook salmon caused by the Pumping Plant shall be determined annually each calendar year starting in 1986. The procedure used to calculate these losses is outlined in Appendix A. This procedure shall be revised by mutual agreement as better information becomes available.

B. The parties recognize the probability that direct losses of striped bass, steelhead and chinook salmon for any given year would be greater had there not been direct losses caused by the Pumping Plant in previous years. Calculation of such losses is not possible with existing knowledge. Therefore, Water Resources agrees to provide \$15,000,000 to initiate a program which will increase the probability of quickly demonstrated results. The monies in this fund are in addition to the compensation for annual losses described in Section I.A. This payment is not intended to cover losses which occurred prior to 1986.

C. Commencing in 1986, Fish and Game will, following approval from Water Resources, undertake measures to compensate for the fish losses identified in Sections I.A and to provide the program set forth in Section I.B. Measures shall be selected in accordance with Sections I.D, I.E and I.F.

D. The following guidelines will be used in determining which measures shall be implemented.

1. Selection of such measures shall be based upon the following:

- a. the magnitude of potential benefits;
- b. evidence of the probability of achieving the benefits;
- c. the costs (capital, operation, maintenance and replacement costs) of the measure in relation to other measures and to the expected benefits;
- d. the ability and the cost to evaluate the success of the measure; and
- e. environmental considerations.

2. Although it is recognized that hatchery operation can be an integral feature of any restoration program, priority shall be given to habitat restoration and other nonhatchery measures which help to protect the genetic diversity of the stocks and to avoid over reliance upon hatcheries. Where hatcheries are chosen, wild brood stock will be used.

3. In selecting salmon measures, priority will be given to measures on the San Joaquin River system.

4. The sum provided in Section I.B. shall be expended over a period of not less than five nor more than ten years from the date of execution of this agreement.

5. It is expected that obligations set forth in Section I.A. shall be met as soon as is practicable after they are incurred. However, compensation for these obligations may be accumulated over a period of years or spent in advance on the expectation of losses. Compensation for those obligations may be accumulated over a period of no more than ten years. Expenditures made in advance shall not exceed the obligations expected for the next ten years.

6. The average amount paid for fish replaced pursuant to Section I.A. shall not exceed the cost of replacing fish with hatchery reared yearling fish. Currently replacement costs are estimated to be \$1.65 per striped bass and \$.55 per steelhead and per yearling salmon. These costs will be adjusted yearly based on evidence of changes in hatchery production costs. During the reviews provided for in Section VI, progress on replacing fish will be reviewed to determine whether this limitation on expenditures is unreasonably constraining the ability to meet the guidelines provided in Section I.D. of this agreement. If so, the limitation on expenditures will be renegotiated.

E. Among the measures to be considered first will be those of Appendix B. At least one measure will be started

in 1987. The consideration of the remaining measures in Appendix B will be completed by December 1988.

F. Fish and Game and Water Resources will jointly appoint and seek input from an advisory committee during the estimation of losses pursuant to I.A. and identification, selection and implementation of measures pursuant to I.C. and D. That committee will consist of interest groups concerned with fish resources affected by the State Water Project, including but not limited to representatives of commercial and sports fishing organizations and representatives of agencies which contract for water from the State Water Project. The process to be followed with regard to any given proposal for measures shall be:

1. The staffs of Fish and Game and Water Resources shall evaluate each proposed measure following the guidelines set forth in Section I.D..

2. The proposal will be submitted to the advisory committee.

3. The proposed measure may be modified based on input from the advisory committee.

4. Recommendations from the staffs and the advisory committee will be presented to the Directors of Fish and Game and Water Resources for a decision.

II. By December 1990, Fish and Game will evaluate the stocking of striped bass to determine the contribution of stocked fish to the fishery using various stocking strategies. Water

Resources will reimburse Fish and Game annually for 30 percent of the cost of the evaluation or \$50,000, whichever is smaller, plus \$5,000 per 100,000 fish marked of those stocked pursuant to this agreement. Both costs will start with fiscal year 1986-87 and will be adjusted annually based on annual percent increases in the average State employee compensation rates. Monies from the Striped Bass Stamp Fund may be used for this evaluation program, but other monies from the Fish and Game Preservation Fund will not be used.

III. Water Resources and Fish and Game may implement a mutually acceptable plan to reduce fish losses by predation in Clifton Court Forebay. Fish and Game will evaluate the effects of the plan and the losses computed under Section I.A. will be reduced to the extent that predation losses are reduced.

IV. When water is being diverted through the Pumping Plant, the John E. Skinner Delta Fish Facility (Skinner Facility) will be operated according to the following procedures:

A. Records satisfactory to Fish and Game will be maintained by Water Resources of the numbers, sizes, and kinds of fish salvaged, water export rates, and Skinner Facility operations.

B. Water Resources will notify Fish and Game well in advance of any scheduled outages and at the time of unscheduled outages, if such outages might affect the effectiveness of the screens at the Skinner Facility. Water Resources is in the process of installing an auxiliary power

source to prevent outages from occurring. If, however, the screens are inoperative, Water Resources will stop diversions through the Pumping Plant unless there is an emergency situation and water is not available from any other source for direct deliveries or unless Fish and Game has determined that the adverse impact on fish is not sufficient to justify cessation of pumping. In making its determination, Fish and Game will consider the kind and numbers of fish present and the State Water Project's need for water as determined by Water Resources.

C. The Skinner Facility will be operated in conformance with mutually acceptable criteria to maximize protection of the Delta fishery.

V. The parties agree that State Water Project Pumping Plant diversions cause direct losses of some species other than striped bass, steelhead and chinook salmon, e.g., American shad and sturgeon.

A. At this time not enough information is available to determine either what the impact of such diversions is on such species or what measures are appropriate to offset such losses. Water Resources and Fish and Game are involved in a variety of studies to determine what the impacts are and what can be done to reduce or eliminate identified adverse impacts. Fish and Game will prepare a report on these subjects by March 1987.

B. Measures to offset losses for fish species not covered in this agreement shall be included when information is obtained to develop effective measures. Measures provided under this agreement will benefit some of these species.

VI. By December 31, 1989, and by December 31 of each year thereafter, Water Resources and Fish and Game shall, with input from the advisory committee set forth in Section I.F, review the success of this agreement in offsetting the direct effects of diversions by the Pumping Plant on fisheries dependent on the Delta. If the agreement is not successful in this regard, it shall be renegotiated to fulfill the State Water Project's responsibilities relating to the direct effects of diversions by the Pumping Plant. The parties will provide an annual report describing the results of the annual review.

VII. Upon execution of this agreement, the parties will begin discussions on developing ways to offset the adverse fishery impacts of the State Water Project which are not covered in this agreement, including facilities needed to offset fishery impacts and provide more efficient conveyance of water. Until agreement is reached between the parties on offsetting such impacts, Water Resources will not increase diversions beyond those set forth in the U.S. Corps of Engineer's Public Notice 5820A, amended, dated October 13, 1981 and Fish and Game shall not unreasonably withhold its approval of such agreement.

VIII. The parties will make every effort to involve the Federal Government in the development of programs which would offset similar impacts of the Federal Central Valley Project.

IX. This agreement is intended to offset direct losses of fish resources caused by State Water Project Pumping Plant diversions. Therefore, Water Resources and Fish and Game will not object to the participation of groups concerned with protecting such fish resources in legal proceedings to enforce this agreement.

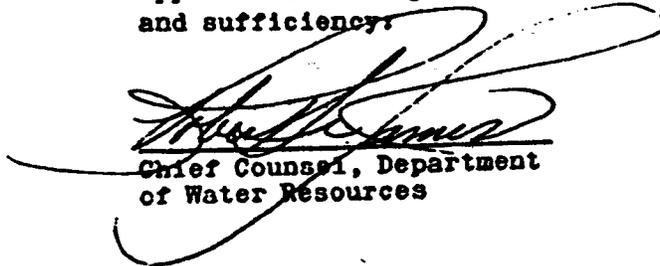
Dated: 12-30-86

Dated: DECEMBER 30, 1986


David N. Kennedy, Director
Department of Water Resources


Jack C. Parnell, Director
Department of Fish and Game

Approved as to legal form
and sufficiency.


Chief Counsel, Department
of Water Resources

I hereby certify that all conditions for exemption set forth in State Administrative Manual Section 127 have been complied with and this document is exempt from review by the Department of Finance.


Signature

FORM	POLICY	BUDGET	
Department of General Services			
APPROVED			
NOV - 4 1987			
ORIGINAL SIGNED BY ELIZABETH YOST			
By	ELIZABETH YOST Chief Deputy Director		

APPENDIX A

PART I ESTIMATION OF THE FIVE YEAR AVERAGE OF YEARLING EQUIVALENT LOSS OF STRIPED BASS (LARGER THAN 20 MM), CHINOOK SALMON, AND STEELHEAD LOST DURING FISH SALVAGE OPERATIONS AT THE INTAKE TO THE CALIFORNIA AQUEDUCT

GENERAL APPROACH

The number of fish lost at the intake to the State Water Project (SWP) export system is calculated from the estimated number of fish salvaged (collected) at the fish facility adjusted by factors affecting their survival. The number of fish salvaged during the first and second half of a month is estimated from a sampling program at the facility. The sampling program is based on fish counts made at fairly regular intervals during the day. Salvage is stratified by size group.

Losses occur both before and after fish are collected in the holding tanks where they are counted. Losses are estimated from the time fish are entrained into the forebay until they are transported and released back into the Delta. Fish entrained into the forebay are lost in two ways before they are collected in the facility; (i) predation loss (P) in the forebay, or (ii) loss through the fish screens. After fish have been collected, some fish die as a result of the handling (H) and trucking (T) required to return them to the Delta.

Losses of fish are standardized to yearling equivalents by estimating the number which would have survived to that age.

Survival of striped bass to the yearling stage is a function of the growth and mortality rates of the various length groups the fish must live through to become yearlings. It is also a function of the time of year during which a given size fish is collected.

Instantaneous growth rates (G) and mortality rates (Z) for each length group were calculated from equations developed by Miller (ms):

$$G = 0.08395 - 0.01793 \times \ln(\text{FL mm})$$
$$\ln(Z) = 1.3906 \times (-0.04236 \times \text{FL mm})$$

These relationships may be modified as additional information on mortality and growth become available. This data was used to calculate the survival rate for each length group and the number of days a fish spends in the group (Table 1). Yearling equivalent survival factors for striped bass are then calculated as the product of the individual survival rates for each length interval that a fish must live through to become a yearling (Table 2). Yearling status for the purposes of this model is defined as living to the first half of March or reaching the 141-150 mm length interval.

TABLE 1. STRIPED BASS SURVIVAL RATES FOR VARIOUS LENGTH GROUPS AND THE NUMBER OF DAYS SPENT IN EACH GROUP

Species	Length Interval (mm)	Survival Rate	^{1/} Number days in length Interval
STRIPED BASS	21 - 25	0.4888	5.75
	26 - 30	0.5592	5.77
	31 - 35	0.6239	5.79
	36 - 40	0.585	8.13
	41 - 50	0.5652	11.64
	51 - 60	0.6873	11.69
	61 - 70	0.7818	11.72
	71 - 80	0.8508	11.75
	81 - 90	0.899	11.78
	91 - 100	0.9328	11.80
	101 - 110	0.9554	11.82
	111 - 120	0.9705	11.84
	121 - 130	0.9806	11.86
131 - 140	0.9872	11.87	
141 - 150	1.0000		

^{1/} Survival rates refer to survival from the mid-point of the length interval to the midpoint of the subsequent interval.

TABLE 2. STRIPED BASS YEARLING EQUIVALENT SURVIVAL FACTORS STRATIFIED BY SIZE GROUP AND TIME OF YEAR ENTRAINED INTO THE STATE WATER PROJECT INTAKE.

LENGTH INTERVAL (MM)	JANUARY		FEBRUARY		MARCH	
	1-15	16-31	1-15	16-28	1-15	16-31
21 - 25	0.031272	0.045179	0.088036	0.223395	0.019418	0.019418
26 - 30	0.058479	0.077698	0.135872	0.297095	0.039728	0.039728
31 - 35	0.096598	0.123084	0.190831	0.363654	0.071047	0.071047
36 - 40	0.145765	0.175729	0.254003	0.438861	0.113870	0.113870
41 - 50	0.231795	0.268512	0.352154	0.524012	1	1
51 - 60	0.383142	0.422170	0.504440	0.654718	1	1
61 - 70	0.532948	0.568128	0.638544	0.757645	1	1
71 - 80	0.661838	0.690287	0.745285	0.833728	1	1
81 - 90	0.762945	0.784325	0.824770	0.887690	1	1
91 - 100	0.837487	0.852821	0.88141	0.924926	1	1
101 - 110	0.897619	0.900928	0.920622	0.950162	1	1
111 - 120	0.939518	0.939518	0.947259	0.967073	1	1
121 - 130	0.968045	0.968045	0.968045	0.978305	1	1
131 - 140	0.987221	0.987221	0.987221	0.987221	1	1
141 - 150	1	1	1	1	1	1

(MM)	APRIL		MAY		JUNE	
	1-15	16-30	1-15	16-31	1-15	16-30
21 - 25	0.019418	0.019418	0.019418	0.019418	0.019418	0.019418
26 - 30	0.039728	0.039728	0.039728	0.039728	0.039728	0.039728
31 - 35	0.071047	0.071047	0.071047	0.071047	0.071047	0.071047
36 - 40	0.113870	0.113870	0.113870	0.113870	0.113870	0.113870
41 - 50	0.194565	0.194565	0.194565	0.194565	0.194565	0.194565
51 - 60	1	1	0.344265	0.344265	0.344265	0.344265
61 - 70	1	1	1	1	0.500875	0.500875
71 - 80	1	1	1	1	0.640696	0.640696
81 - 90	1	1	1	1	1	1
91 - 100	1	1	1	1	1	1
101 - 110	1	1	1	1	1	1
111 - 120	1	1	1	1	1	1
121 - 130	1	1	1	1	1	1
131 - 140	1	1	1	1	1	1
141 - 150	1	1	1	1	1	1

Table 2 (continued)

LENGTH INTERVAL (MM)	JULY		AUGUST		SEPTEMBER	
	1-15	16-31	1-15	16-31	1-15	16-30
21 - 25	0.019418	0.019418	0.019418	0.019418	0.019418	0.019418
26 - 30	0.039728	0.039728	0.039728	0.039728	0.039728	0.039728
31 - 35	0.071047	0.071047	0.071047	0.071047	0.071047	0.071047
36 - 40	0.113870	0.113870	0.113870	0.113870	0.113870	0.113870
41 - 50	0.194565	0.194565	0.194565	0.194565	0.194565	0.194565
51 - 60	0.344265	0.344265	0.344265	0.344265	0.344265	0.344265
61 - 70	0.500875	0.500875	0.500875	0.500875	0.500875	0.500875
71 - 80	0.640696	0.640696	0.640696	0.640696	0.640696	0.640696
81 - 90	0.753069	0.753069	0.753069	0.753069	0.753069	0.753069
91 - 100	1	1	0.837306	0.837306	0.837306	0.837306
101 - 110	1	1	0.897619	0.897619	0.897619	0.897619
111 - 120	1	1	1	1	0.939518	0.939518
121 - 130	1	1	1	1	0.968045	0.968045
131 - 140	1	1	1	1	1	1
141 - 150	1	1	1	1	1	1

(MM)	OCTOBER		NOVEMBER		DECEMBER	
	1-15	16-31	1-15	16-30	1-15	16-31
21 - 25	0.019418	0.01957	0.020041	0.020879	0.022387	0.025152
26 - 30	0.039728	0.039791	0.040616	0.041955	0.044277	0.048864
31 - 35	0.071047	0.071047	0.071952	0.073943	0.077427	0.083608
36 - 40	0.113870	0.113870	0.114601	0.117080	0.121355	0.129507
41 - 50	0.194565	0.194565	0.194565	0.197378	0.203051	0.212927
51 - 60	0.344265	0.344265	0.344265	0.344689	0.351187	0.36234
61 - 70	0.500875	0.500875	0.500875	0.500875	0.503294	0.513754
71 - 80	0.640696	0.640696	0.640696	0.640696	0.640696	0.646081
81 - 90	0.753069	0.753069	0.753069	0.753069	0.753069	0.753069
91 - 100	0.837306	0.837306	0.837306	0.837306	0.837306	0.837306
101 - 110	0.897619	0.897619	0.897619	0.897619	0.897619	0.897619
111 - 120	0.939518	0.939518	0.939518	0.939518	0.939518	0.939518
121 - 130	0.968045	0.968045	0.968045	0.968045	0.968045	0.968045
131 - 140	0.987221	0.987221	0.987221	0.987221	0.987221	0.987221
141 - 150	1	1	1	1	1	1

Yearling equivalent survival factors for salmon and steelhead were developed by DFG from marking experiments involving young-of-the-year (YOY) and yearling Sacramento River chinook salmon released in the Delta (Hallock 1979). These studies found that YOY contributed to the ocean fisheries at a rate of 0.96% while yearlings contributed at a rate of 5.58%. Therefore, the ratio 0.96/5.58 was used as the yearling equivalent survival factor of YOY chinook salmon and also for steelhead. For the purposes of this model YOY are considered any salmonid from 1 - 100 mm.

Species	Length Interval (mm)	Survival Rate ^{1/}
CHINOOK	1 - 100	0.1724
SALMON	≥ 101	1.0000
STEELHEAD	1 - 100	0.1724
	≥ 101	1.0000

ESTIMATION PROCESS

Loss estimates are generated for each time interval, species, and size group. These are summed over time to estimate bimonthly and annual losses. Each year's replacement obligation is the average of the annual loss estimates for the previous five years.

EFFICIENCY OF FISH SCREENS

Parameters used to calculate screening loss are influenced by the size of the fish and the velocity of water passing through the fish screens. Regression equations predicting screening efficiencies for different length intervals of fish, based on primary water velocity (fps), were developed from data collected during a field testing program at the fish facility in 1970 -71:

Striped Bass

Length Interval (mm)

A) 21 - 30	Eff(A) = 0.935 - (0.149 x Velocity)
B) 31 - 40	Eff(B) = 0.806 - (0.0431 x Velocity)
C) ≥ 41	Eff(C) = 0.945 - (0.0717 x Velocity)

Chinook Salmon and Steelhead

Length Interval (mm)

A) 1 - 100	Eff(A) = 0.630 + (0.0494 x Velocity)
B) ≥ 101	Eff(B) = 0.568 + (0.0579 x Velocity)

^{1/} These estimates will be revised based on an evaluation of experimental results prior to estimating the 1986 annual replacement obligation.

NUMBER OF FISH ENCOUNTERING FISH SCREENS

The number of fish encountering the screens after crossing the forebay is calculated by dividing the number of fish salvaged by the screening efficiency (Eff):

$$\# \text{Encountering Screens} = \# \text{Salvaged} / \text{Eff}$$

PREDATION LOSS IN CLIFTON COURT FOREBAY

The number of fish entrained into the forebay is calculated by dividing the number of fish encountering the screens by the proportion of fish which survive crossing the forebay (1-P):

$$\# \text{Entrained} = \# \text{Encountering Screens} / (1-P)$$

HANDLING AND TRUCKING LOSSES

The number of fish released alive is calculated by multiplying the number of fish salvaged by the survival rates for the handling (1-H) and trucking (1-T) operations:

$$\# \text{Alive} = \# \text{Salvaged} \times (1-H) \times (1-T)$$

SYSTEM LOSS

The number of fish lost due to SWP operations is calculated as the difference between the number of fish estimated to have been entrained into the forebay and the number of fish released alive back into the Delta:

$$\text{System Loss} = \# \text{Entrained} - \# \text{Alive}$$

TABLE 3. VALUES OF PARAMETERS USED IN COMPUTATIONS. ^{1/}

	Striped Bass	Salmon	Steelhead
	-----	-----	-----
Predation (P)	0.10	0.75	0.75
Handling (H) ^{2/}	0.20	0.47	0.47
Trucking (T) ₋	0	0	0

^{1/} These estimates will be revised based on an evaluation of experimental results prior to estimating the 1986 annual replacement obligation.

^{2/} Handling and trucking loss rates in this table are combined and listed under handling. When more information is available H and T values will be separated.

YEARLING EQUIVALENT LOSS

The number of fish loss as a result of entrainment into the SWP intake is calculated by multiplying the system loss by the appropriate yearling equivalent survival factor:

$$\text{Yearling Equivalent Loss} = \text{System loss} \times \text{Survival Factor}$$

Annual losses are averaged over the previous five years to compute the annual replacement obligation. For Part I, sufficient information is available to compute five year means starting in 1986.

PART II ESTIMATION OF THE YEARLING EQUIVALENT LOSS OF STRIPED BASS (LESS THAN 21 MM) LOST ANNUALLY DURING FISH SALVAGE OPERATIONS AT THE INTAKE TO THE CALIFORNIA AQUEDUCT

GENERAL APPROACH

The densities of striped bass eggs and larvae in Old River in the vicinity of the intake to Clifton Court Forebay will be monitored during the striped bass spawning period. Thoses densities will be used to estimate the number of eggs and larvae entrained into the forebay, based on the assumption that water drawn into the forebay contains the mean densities of eggs and larvae measured in Old River.

All eggs and larvae drawn into the forebay are assumed to be lost. The number lost is converted to yearling equivalents based on values used by Baracco (1983).

Length Group	Survival Rate to Yearlings
Eggs	0.000047
3-6 mm	0.000124
7-10 mm	0.000338
11-14 mm	0.002509
15-18 mm	0.006415
19-20 mm	0.020414

Since direct measurements of egg and larval losses started in 1985, the 1986 replacement obligation will be the 1985 loss estimate. Each subsequent year through 1990 the obligation will be the average of prior annual losses. Commencing in 1991, a five year moving average will be used.

APPENDIX B

Potential mitigation measures are:

- I. Projects in the Sacramento-San Joaquin Delta
 - A. Striped bass grow out facilities for fish salvaged at the J.F. Skinner Delta Fish Protective Facility.
 - B. Screening of large Delta agricultural diversions.
 - C. Striped bass hatchery production augmentation.
 - D. Sherman Island joint use facility cost sharing for intake screening and operation in all years.
 - E. Construction of a permanent Old River Barrier to provide fishery benefits in the south Delta.

- II. Projects on the San Joaquin River
 - A. Augmentation of San Joaquin River tributary flows by water purchases or exchanges, or by water development or conservation projects.
 - B. San Joaquin River chinook salmon hatchery.

- III. Projects on the Sacramento River
 - A. Mill Creek fish passage problem correction.
 - B. Provide assistance to the development and implementation of measures to correct problems at the Glenn-Colusa fish screen.
 - C. Flow augmentations on rivers tributary to the Sacramento River.

December 6, 1996

David N. Kennedy, Director
Department of Water Resources

Jacqueline E. Schafer, Director
Department of Fish and Game

-Department of Fish and Game

Delta Pumping Plant Fish Protection Agreement - Amendment

Attached for your approval is Amendment 1 of the Delta Pumping Plant Fish Protection (4-Pumps) Agreement. The amendment provides the Department of Water Resources and the Department of Fish and Game five more years to spend the \$9 million that still remains of the \$15 million provided under Paragraph I.B. of the original agreement. It also changes the factors DFG is to use to convert the calculated striped bass losses to yearling equivalents. The latter change formally adopts the factors that DFG has actually been using for the past 10 years.

The Delta Pumping Plant Fish Advisory Committee has reviewed the amendment and recommended their approval. We agree with the Committee's recommendation.

RECOMMEND APPROVAL:

Original signed by

Original signed by

Randall L. Brown, Chief
Environmental Services Office
Department of Water Resources

Perry Herrgesell, Chief
Bay-Delta and Special
Water Projects Division
Department of Fish and Game

Date DEC 1 2 1996

Date DEC 1 3 1996

Attachment

SFord:Sandy Springer

Text Area:c:\wpdocs\Ford\4pamdt

Spell Check: 12/6/96

**AMENDMENT ONE TO AGREEMENT BETWEEN
THE DEPARTMENT OF WATER RESOURCES AND
THE DEPARTMENT OF FISH AND GAME
TO OFFSET DIRECT FISH LOSSES IN RELATION TO
THE HARVEY O. BANKS DELTA PUMPING PLANT**

This Amendment One is made on November 6, 1996 between the Department of Water Resources (DWR) and Department of Fish and Game (DFG) to amend their 1986 agreement to offset direct losses of fish caused by the diversion of water by the Harvey O. Banks Delta Pumping Plant.

Recitals:

1. On December 30, 1986, DWR and DFG entered into an agreement to offset direct losses of fish caused by the diversion of water by the Harvey O. Banks Delta Pumping Plant (Delta Pumping Plant) since 1986.
2. In Paragraph I.B of the 1986 Agreement, the parties recognized that direct losses of fish for any given year would probably have been greater had there not been direct losses caused by the Pumping Plant in previous years. DWR agreed to provide \$15 million for fishery improvement projects to offset these potentially higher losses. Paragraph D.4. requires the \$15 million to be expended by December 29, 1996. However, DWR and DFG will have spent only about \$6 million by that time. About \$9 million will not have been spent.
3. Paragraph I.A. of the 1986 Agreement specifies that losses of striped bass, steelhead and salmon be calculated as outlined in Appendix A of that Agreement. This procedure is to be revised by mutual agreement as better information becomes available. Table 2 of Appendix A of the 1986 Agreement specifies the factors to be used to convert the losses of striped bass to yearling equivalent values. DFG has always used the factors presented in Attachment 1 of this amendment to calculate losses of bass as yearling equivalents.
4. At the November 6, 1996, Delta Pumping Plant Fish Advisory Committee Meeting, committee members reviewed and approved the draft of this Amendment One and recommended that the Amendment be submitted to the Directors of DWR and DFG for signature.

Memorandum

To : Larry Chee,
Department of Water Resources

Date : January 25, 1991

From : Department of Fish and Game

Subject: Revised Striped Bass Yearling Equivalent Survival Factors

I have reviewed the table of striped bass yearling equivalent survival factors you transmitted to me in your 1-16-91 memo. The survival factors are correct. However, I had already made these revisions and submitted them to Pete through Dan last July, 1990 as a revised Appendix A. Apparently, that was lost in the works somewhere. I am enclosing a copy of my revised Appendix A.

Barry W Collins

Barry Collins
Assoc. Fishery Biologist
Bay-Delta Project

BC/fs

cc: Dan Odenweller, Bay-Delta Project
H.K. Chadwick, Bay-Delta Project

APPENDIX A

PART I ESTIMATION OF THE FIVE YEAR AVERAGE OF YEARLING EQUIVALENT LOSS OF STRIPED BASS (LARGER THAN 20 MM), CHINOOK SALMON, AND STEELHEAD LOST DURING FISH SALVAGE OPERATIONS AT THE INTAKE TO THE CALIFORNIA AQUEDUCT

GENERAL APPROACH

The number of fish lost at the intake to the State Water Project (SWP) export system is calculated from the estimated number of fish salvaged (collected) at the fish facility adjusted by factors affecting their survival. The number of fish salvaged during the first and second half of a month is estimated from a sampling program at the facility. The sampling program is based on fish counts made at fairly regular intervals during the day. Salvage is stratified by size group.

Losses occur both before and after fish are collected in the holding tanks where they are counted. Losses are estimated from the time fish are entrained into the forebay until they are transported and released back into the Delta. Fish entrained into the forebay are lost in two ways before they are collected in the facility; (i) predation loss (P) in the forebay, (ii) loss through the fish screens. After fish have been collected, some fish die as a result of the handling (H) and trucking (T) required to return them to the Delta.

Losses of fish are standardized to yearling equivalents by estimating the number which would have survived to that age.

Survival of striped bass to the yearling stage is a function of the growth and mortality rates of the various length groups the fish must live through to become yearlings. It is also a function of the time of year during which a given size fish is collected.

Instantaneous growth rates (G) and mortality rates (Z) for each length group were calculated from equations developed by Miller (ms):

$$\ln(Z) = -1.10957 - 0.04236 \times FL \text{ mm}$$

$$\ln(G) = -2.78628 - 0.03245 \times FL \text{ mm}$$

Daily growth was estimated at the mid-point of each length interval by the following equation, where $(t_2 - t_1) = 1$ day:

$$L(t+1) = L(t) \times e^{G(t_2 - t_1)}$$

The daily growth rate for each length group (i) was then calculated as the mean of the daily growth rates at the mid-points of length groups (i) and (i+1).

These relationships may be modified as additional information on mortality and growth become available. This data was used to calculate the survival rate for each length group and the number of days a fish spends in the group (Table 1). Yearling equivalent survival factors for striped bass are then calculated as the product of the individual survival rates for each length interval that a fish must live through to become a yearling (Table 2). Yearling status for the purposes of this model is defined as living to the first half of March or reaching the 141-150 mm length interval.

TABLE 1. STRIPED BASS SURVIVAL RATES FOR VARIOUS LENGTH GROUPS AND THE NUMBER OF DAYS SPENT IN EACH GROUP

Species	Length Interval (mm)	Survival Rate ^{1/}	Number days in length Interval
STRIPED BASS	21 - 25	0.4082	7.2
	26 - 30	0.4892	7.1
	31 - 35	0.5562	7.2
	36 - 40	0.5005	10.5
	41 - 50	0.4477	16.4
	51 - 60	0.5453	18.9
	61 - 70	0.6247	22.4
	71 - 80	0.6898	27.0
	81 - 90	0.7416	33.2
	91 - 100	0.7835	41.4
	101 - 110	0.8182	52.0
	111 - 120	0.8467	65.9
	121 - 130	0.8701	84.1
131 - 140	0.8896	108.0	
141 - 150	0.9058	139.5	
	≥ 151		

^{1/} Survival rates refer to survival from the mid-point of the length interval to the mid-point of the subsequent interval.

TABLE 2. STRIPED BASS YEARLING EQUIVALENT SURVIVAL FACTORS STRATIFIED BY SIZE GROUP AND TIME OF YEAR ENTRAINED INTO THE STATE WATER PROJECT.

Semi-Monthly Period		21-25 mm	26-30 mm	31-35 mm	36-40 mm	41-50 mm
JAN	1	0.017741	0.034535	0.060131	0.092805	0.150022
	2	0.030892	0.055883	0.090934	0.129617	0.203513
FEB	3	0.072347	0.116592	0.168253	0.216577	0.308627
	4	0.205760	0.278857	0.355389	0.421823	0.503530
MAR	5	0.002157	0.005229	0.010560	0.018725	1
	6	0.002211	0.005360	0.010825	0.019195	1
APR	7	0.002270	0.005504	0.011115	0.019710	0.038623
	8	0.002327	0.005642	0.011394	0.020205	0.039593
MAY	9	0.002397	0.005784	0.011681	0.020713	0.040588
	10	0.002489	0.005996	0.012035	0.021233	0.041607
JUN	11	0.002592	0.006244	0.012531	0.022083	0.042878
	12	0.002692	0.006485	0.013015	0.022935	0.044534
JUL	13	0.002797	0.006735	0.013518	0.023821	0.046254
	14	0.002963	0.007070	0.014056	0.024741	0.048040
AUG	15	0.003152	0.007521	0.014952	0.026097	0.050022
	16	0.003340	0.007969	0.015843	0.027652	0.052950
SEP	17	0.003627	0.008528	0.016852	0.029414	0.056322
	18	0.003962	0.009316	0.018256	0.031403	0.059678
OCT	19	0.004328	0.010177	0.019944	0.034306	0.064306
	20	0.004936	0.011350	0.021787	0.037477	0.070250
NOV	21	0.005701	0.013108	0.025126	0.042267	0.077197
	22	0.006895	0.015319	0.028759	0.048378	0.087780
DEC	23	0.008475	0.018829	0.034896	0.056735	0.100472
	24	0.011576	0.024409	0.042968	0.069733	0.120391

TABLE 2. Continued.

Semi- Monthly Period	51-60 mm	61-70 mm	71-80 mm	81-90 mm	91-100 mm
JAN 1	0.267298	0.395377	0.517053	0.636937	0.732085
2	0.328535	0.464298	0.591813	0.695812	0.775713
FEB 3	0.450597	0.578569	0.683508	0.777180	0.847867
4	0.638145	0.745224	0.824871	0.881578	0.920797
MAR 5	1	1	1	1	1
6	1	1	1	1	1
APR 7	1	1	1	1	1
8	1	1	1	1	1
MAY 9	0.088168	1	1	1	1
10	0.090383	1	1	1	1
JUN 11	0.092807	0.164786	0.253976	1	1
12	0.095369	0.168926	0.260356	1	1
JUL 13	0.099052	0.173169	0.266896	0.370199	1
14	0.102877	0.179686	0.273601	0.379499	1
AUG 15	0.107120	0.187097	0.282796	0.389676	0.497496
16	0.111257	0.194322	0.293717	0.399465	0.509993
SEP 17	0.118007	0.202337	0.305831	0.414317	0.523670
18	0.125039	0.212971	0.317641	0.430317	0.536824
OCT 19	0.132491	0.225663	0.331074	0.446934	0.554296
20	0.142362	0.239111	0.350803	0.464193	0.575701
NOV 21	0.156441	0.256420	0.373146	0.487611	0.599445
22	0.170902	0.280122	0.395383	0.516669	0.622594
DEC 23	0.193498	0.306016	0.428994	0.547459	0.649542
24	0.221476	0.342336	0.468648	0.580084	0.688251

TABLE 2. Continued.

Semi- Monthly Period	101-110 mm	111-120 mm	121-130 mm	131-140 mm	141-150 mm
JAN 1	0.803845	0.861540	0.907024	0.938102	0.959032
2	0.843837	0.894810	0.929809	0.953466	0.969286
FEB 3	0.897581	0.931715	0.954744	0.970131	0.980344
4	0.947408	0.965254	0.977110	0.984952	0.990123
MAR 5	1	1	1	1	1
6	1	1	1	1	1
APR 7	1	1	1	1	1
8	1	1	1	1	1
MAY 9	1	1	1	1	1
10	1	1	1	1	1
JUN 11	1	1	1	1	1
12	1	1	1	1	1
JUL 13	1	1	1	1	1
14	1	1	1	1	1
AUG 15	0.596247	1	1	1	1
16	0.607762	1	1	1	1
SEP 17	0.624061	0.712355	0.783436	1	1
18	0.639737	0.724022	0.796267	1	1
OCT 19	0.655808	0.735879	0.809308	0.862891	0.905856
20	0.672282	0.753957	0.822562	0.872116	0.908079
NOV 21	0.690310	0.774176	0.836940	0.882066	0.918439
22	0.715664	0.793623	0.850647	0.892512	0.928259
DEC 23	0.743301	0.813559	0.864579	0.907130	0.938183
24	0.772005	0.833996	0.883336	0.921986	0.948214

The Yearling Equivalent Survival Factor (YESF) for young-of-the-year (YOY) chinook salmon (1-100 mm) is defined as the ratio of the ocean contribution rate of YOY salmon reaching the Delta (0.96%) to the ocean contribution rate of yearling salmon (>100 mm) not impacted by Delta pumping (3.0%):

$$0.96 / 3.0 = 0.32$$

The above ocean contribution rate of 0.96% was developed by Hallock (1979) for hatchery smolt-sized (YOY) chinook salmon from the Sacramento River system. The ocean contribution rate of 3.0% is based on ocean recoveries of coded wire tagged yearling fall run chinook salmon reared at the Feather River and Mokelumne River hatcheries and released at Rio Vista and Vallejo.

The Yearling Equivalent Survival Factor (YESF) for yearling chinook salmon (>100 mm) is defined as 1.0.

Adequate information is not available for steelhead, therefore, chinook salmon data is used to estimate the YESF. The YESF for YOY steelhead (1-100 mm) is defined as the ratio of the ocean contribution rate of YOY salmon reaching the Delta (0.96%) to the ocean contribution rate of yearling salmon (>100 mm) impacted by Delta pumping (1.1%):

$$0.96 / 1.1 = 0.8727$$

The above ocean contribution rate of 1.1% is based on ocean recoveries of coded wire tagged yearling fall run chinook salmon reared at the Merced River Hatchery and released in the Merced River.

The Yearling Equivalent Survival Factor (YESF) for yearling steelhead (>100 mm) is defined as 1.0.

<u>Species</u>	<u>Length Interval (mm)</u>	<u>Survival Rate</u>
CHINOOK SALMON	1 - 100	0.32
	≥ 101	1.0000
STEELHEAD	1 - 100	0.8727
	≥ 101	1.0000

ESTIMATION PROCESS

Loss estimates are generated for each time interval, species, and size group. These are summed over time to estimate semi-monthly and annual losses. Each year's replacement obligation is the average of the annual loss estimates for the previous five years.

EFFICIENCY OF FISH SCREENS

Parameters used to calculate screening loss are influenced by the size of the fish and the velocity of water passing through the fish screens. Regression equations predicting screening efficiencies for different length intervals of fish, based on primary water velocity (fps), were developed from data collected during a field testing program at the fish facility in 1970-71:

Striped Bass

Length Interval (mm)

A) 21 - 30	Eff(A) = 0.935 - (0.149 x Velocity)
B) 31 - 40	Eff(B) = 0.806 - (0.0431 x Velocity)
C) ≥ 41	Eff(C) = 0.945 - (0.0717 x Velocity)

Chinook Salmon and Steelhead

Length Interval (mm)

A) 1 - 100	Eff(A) = 0.630 + (0.0494 x Velocity)
B) ≥ 101	Eff(B) = 0.568 + (0.0579 x Velocity)

NUMBER OF FISH ENCOUNTERING FISH SCREENS

The number of fish encountering the screens after crossing the forebay is calculated by dividing the number of fish salvaged by the screening efficiency (Eff):

$$\# \text{Encountering Screens} = \# \text{Salvaged} / \text{Eff}$$

PREDATION LOSS IN CLIFTON COURT FOREBAY

The number of fish entrained into the forebay is calculated by dividing the number of fish encountering the screens by the proportion of fish which survive crossing the forebay (1-P):

$$\# \text{Entrained} = \# \text{Encountering Screens} / (1-P)$$

HANDLING AND TRUCKING LOSSES

The number of fish released alive is calculated by multiplying the number of fish salvaged by the survival rates for the handling (1-H) and trucking (1-T) operations:

$$\# \text{Alive} = \# \text{Salvaged} \times (1-H) \times (1-T)$$

SYSTEM LOSS

The number of fish lost due to SWP operations is calculated as the difference between the number of fish estimated to have been entrained into the forebay and the number of fish released alive back into the Delta:

$$\text{System Loss} = \# \text{Entrained} - \# \text{Alive}$$

TABLE 3. PRE-SCREENING LOSS RATE (P), HANDLING LOSS RATE (H), AND TRUCKING LOSS RATE (T) USED AS DEFAULT PARAMETERS IN THE YEARLING EQUIVALENT LOSS MODEL FOR EACH LENGTH GROUP (I).

	<u>I</u>	<u>P(I)</u>	<u>H(I)</u>	<u>T(I)</u>
Striped Bass	1	0.99	0.47	0.43
	2	0.99	0.45	0.41
	3	0.99	0.42	0.39
	4	0.99	0.40	0.36
	5	0.93	0.37	0.34
	6	0.83	0.35	0.31
	7	0.75	0.32	0.29
	8	0.68	0.30	0.26
	9	0.60	0.26	0.23
	10	0.50	0.21	0.18
	11	0.42	0.16	0.13
	12	0.35	0.11	0.08
	13	0.29	0.06	0.03
	14	0.23	0.01	0.00
	15	0.18	0.00	0.00
	16	0.14	0.00	0.00
	17	0.1	0.00	0.00
	18	0.06	0.00	0.00
	19	0.03	0.00	0.00
Chinook Salmon	20	0.75	0.02	0.00
	21	0.75	0.00	0.00
Steelhead	22	0.75	0.02	0.00
	23	0.75	0.00	0.00

YEARLING EQUIVALENT LOSS

The number of fish lost as a result of entrainment into the SWP intake is calculated by multiplying the system loss by the appropriate yearling equivalent survival factor:

$$\text{Yearling Equivalent Loss} = \text{System loss} \times \text{Survival Factor}$$

Annual losses are averaged over the previous five years to compute the annual replacement obligation. For Part I, sufficient information is available to compute a running five year average starting in 1986.

PART II ESTIMATION OF THE YEARLING EQUIVALENT LOSS OF STRIPED BASS (LESS THAN 21 MM) LOST ANNUALLY DURING FISH SALVAGE OPERATIONS AT THE INTAKE TO THE CALIFORNIA AQUEDUCT

GENERAL APPROACH

The densities of striped bass eggs and larvae in Old River in the vicinity of the intake to Clifton Court Forebay will be monitored during the striped bass spawning period. Those densities will be used to estimate the number of eggs and larvae entrained into the forebay, based on the assumption that water drawn into the forebay contains the mean densities of eggs and larvae measured in Old River.

All eggs and larvae drawn into the forebay are assumed to be lost. The number lost is converted to yearling equivalents based on values used by Baracco (1983).

<u>Length Group</u>	<u>Survival Rate to Yearlings</u>
Eggs	0.000047
3-6 mm	0.000124
7-10 mm	0.000338
11-14 mm	0.002509
15-18 mm	0.006415
19-20 mm	0.020414

Since direct measurements of egg and larval losses started in 1985, the 1986 replacement obligation will be the 1985 loss estimate. Each subsequent year through 1990 the obligation will be the average of

prior annual losses. Commencing in 1991, a running five year average will be used.

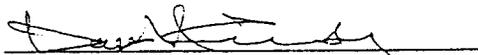
LITERATURE CITED

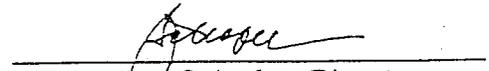
Hallock, R.J. 1979. The status of inland habitat and the factors adversely impacting salmon resources. Calif. Dept. Fish and Game Memorandum Report, Sacramento.

AGREEMENT #B-56172

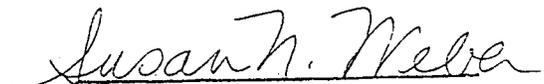
The Department of Water Resources and the Department of Fish and Game agree to the following:

1. The period to expend the remainder of the \$15 million provided for fishery improvement projects is extended to December 29, 2001. The money will be allocated as specified in Attachment 2 of this amendment, unless otherwise recommended by the Delta Pumping Plant Agreement Fish Advisory Committee and agreed to by the Department Water Resources and the Department of Fish and Game.
2. The factors presented in Attachment 1 of this amendment will be used to calculate the number of yearling equivalent striped bass lost at the Delta Pumping Plant. These factors will replace those presented in Table 2 of Appendix A of the original agreement.
3. This Amendment One shall become effective upon signatures below and approval by the Department of General Services.


David N. Kennedy, Director
Department of Water Resources


Jacqueline Schafer, Director
Department of Fish and Game

Approved as to legal form
and sufficiency:


Susan N. Weber
Chief Counsel, Department
of Water Resources

Attachments:

1. Striped bass yearling equivalent survival factors.
2. Allocation of \$15 million account.

FORM	POLICY	BUDGET
Department of General Services		
APPROVED		
MAY 5 1997		
BY		
Ass't. Chief Counsel		

TABLE 2. STRIPED BASS YEARLING EQUIVALENT SURVIVAL FACTORS STRATIFIED BY SIZE GROUP AND TIME OF YEAR ENTRAINED INTO THE STATE WATER PROJECT.

Semi-Monthly Period		21-25 mm	26-30 mm	31-35 mm	36-40 mm	41-50 mm
JAN	1	0.017741	0.034535	0.060131	0.092805	0.150022
	2	0.030892	0.055883	0.090934	0.129617	0.203513
FEB	3	0.072347	0.116592	0.168253	0.216577	0.308627
	4	0.205760	0.278857	0.355389	0.421823	0.503530
MAR	5	0.002157	0.005229	0.010560	0.018725	1
	6	0.002211	0.005360	0.010825	0.019195	1
APR	7	0.002270	0.005504	0.011115	0.019710	0.038623
	8	0.002327	0.005642	0.011394	0.020205	0.039593
MAY	9	0.002397	0.005784	0.011681	0.020713	0.040588
	10	0.002489	0.005996	0.012035	0.021233	0.041607
JUN	11	0.002592	0.006244	0.012531	0.022083	0.042878
	12	0.002692	0.006485	0.013015	0.022935	0.044534
JUL	13	0.002797	0.006735	0.013518	0.023821	0.046254
	14	0.002963	0.007070	0.014056	0.024741	0.048040
AUG	15	0.003152	0.007521	0.014952	0.026097	0.050022
	16	0.003340	0.007969	0.015843	0.027652	0.052950
SEP	17	0.003627	0.008528	0.016852	0.029414	0.056322
	18	0.003962	0.009316	0.018256	0.031403	0.059678
OCT	19	0.004328	0.010177	0.019944	0.034306	0.064306
	20	0.004936	0.011350	0.021787	0.037477	0.070250
NOV	21	0.005701	0.013108	0.025126	0.042267	0.077197
	22	0.006895	0.015319	0.028759	0.048378	0.087780
DEC	23	0.008475	0.018829	0.034896	0.056735	0.100472
	24	0.011576	0.024409	0.042968	0.069733	0.120391

TABLE 2. Continued.

Semi- Monthly Period	51-60 mm	61-70 mm	71-80 mm	81-90 mm	91-100 mm
JAN 1	0.267298	0.395377	0.517053	0.636937	0.732085
2	0.328535	0.464298	0.591813	0.695812	0.775713
FEB 3	0.450597	0.578569	0.683508	0.777180	0.847867
4	0.638145	0.745224	0.824871	0.881578	0.920797
MAR 5	1	1	1	1	1
6	1	1	1	1	1
APR 7	1	1	1	1	1
8	1	1	1	1	1
MAY 9	0.088168	1	1	1	1
10	0.090383	1	1	1	1
JUN 11	0.092807	0.164786	0.253976	1	1
12	0.095369	0.168926	0.260356	1	1
JUL 13	0.099052	0.173169	0.266896	0.370199	1
14	0.102877	0.179686	0.273601	0.379499	1
AUG 15	0.107120	0.187097	0.282796	0.389676	0.497496
16	0.111257	0.194322	0.293717	0.399465	0.509993
SEP 17	0.118007	0.202337	0.305831	0.414317	0.523670
18	0.125039	0.212971	0.317641	0.430317	0.536824
OCT 19	0.132491	0.225663	0.331074	0.446934	0.554296
20	0.142362	0.239111	0.350803	0.464193	0.575701
NOV 21	0.156441	0.256420	0.373146	0.487611	0.599445
22	0.170902	0.280122	0.395383	0.516669	0.622594
DEC 23	0.193498	0.306016	0.428994	0.547459	0.649542
24	0.221476	0.342336	0.468648	0.580084	0.688251

TABLE 2. Continued.

Semi- Monthly Period	101-110 mm	111-120 mm	121-130 mm	131-140 mm	141-150 mm
JAN 1	0.803845	0.861540	0.907024	0.938102	0.959032
2	0.843837	0.894810	0.929809	0.953466	0.969286
FEB 3	0.897581	0.931715	0.954744	0.970131	0.980344
4	0.947408	0.965254	0.977110	0.984952	0.990123
MAR 5	1	1	1	1	1
6	1	1	1	1	1
APR 7	1	1	1	1	1
8	1	1	1	1	1
MAY 9	1	1	1	1	1
10	1	1	1	1	1
JUN 11	1	1	1	1	1
12	1	1	1	1	1
JUL 13	1	1	1	1	1
14	1	1	1	1	1
AUG 15	0.596247	1	1	1	1
16	0.607762	1	1	1	1
SEP 17	0.624061	0.712355	0.783436	1	1
18	0.639737	0.724022	0.796267	1	1
OCT 19	0.655808	0.735879	0.809308	0.862891	0.905856
20	0.672282	0.753957	0.822562	0.872116	0.908079
NOV 21	0.690310	0.774176	0.836940	0.882066	0.918439
22	0.715664	0.793623	0.850647	0.892512	0.928259
DEC 23	0.743301	0.813559	0.864579	0.907130	0.938183
24	0.772005	0.833996	0.883336	0.921986	0.948214

**DELTA PUMPING PLANT FISH PROTECTION AGREEMENT
\$15 MILLION ACCOUNT**

Anticipated Allocation of Remaining Funds

PROJECTS	AMOUNT FUNDED	COMPLETION DATE
Tuolumne River Salmon Restoration Center	\$4,500,000	JUN 2001
Deer Creek Water Exchange Project	\$1,650,000	JUN 1999
Suisun Marsh Wetland Diversion Screening	\$2,000,000	DEC 1997
San Joaquin Predator Isolation Projects	<u>\$1,000,000</u>	DEC 1999
TOTAL	\$9,150,000	

M e m o r a n d u m

Date : **DEC 13 2001**

To : Thomas M. Hannigan, Director
Department of Water Resources

Robert C. Hight, Director
Department of Fish and Game

From : Department of Water Resources -Department of Fish and Game

Subject : Delta Pumping Plant Fish Protection Agreement - Amendment

Attached for your approval is Amendment Two of the Delta Pumping Plant Fish Protection (Four Pumps) Agreement. The amendment provides the Department of Water Resources and the Department of Fish and Game three more years to spend the \$5 million that still remains of the \$15 million provided under Paragraph I.B. of the original agreement.

The Delta Pumping Plant Advisory Committee reviewed the amendment and recommended its approval. We also recommend approval.

If you need further information, please contact Stephani Spaar, Staff Environmental Scientist of the Environmental Services Office at (916) 227-7536.

RECOMMEND APPROVAL:

RECOMMEND APPROVAL:

Barbara McDonnell
Barbara McDonnell, Chief
Environmental Services Office
Department of Water Resources

Perry L. Herrgesell
Perry Herrgesell, Chief
Central Valley Bay-Delta Branch
Department of Fish and Game

Date: December 13, 2001

Date: 12/14/01

Attachment



AMENDMENT TWO TO AGREEMENT BETWEEN
THE DEPARTMENT OF WATER RESOURCES AND
THE DEPARTMENT OF FISH AND GAME
TO OFFSET DIRECT LOSSES IN RELATION TO
THE HARVEY O. BANKS DELTA PUMPING PLANT

This Amendment Two is made on November 30, 2001 between the Department of Water Resources and the Department of Fish and Game to amend their 1986 agreement to offset direct losses of fish caused by the diversion of water by the Harvey O. Banks Delta Pumping Plant.

Recitals:

1. On December 30, 1986, DWR and DFG entered into an agreement to offset direct losses of fish caused by the diversion of water by the Harvey O. Banks Delta Pumping Plant (Delta Pumping Plant) since 1986.
2. In Paragraph I.B. of the 1986 Agreement, the parties recognized that direct losses of fish for any given year would probably have been greater had there not been direct losses caused by the Delta Pumping Plant in previous years. DWR agreed to provide \$15 million for fishery improvement projects to offset these potentially higher losses. Paragraph D.4. required the \$15 million to be expended by December 29, 1996. However, DWR and DFG spent only about \$6 million by that time. About \$9 million was not spent.
3. On December 13, 1996, DWR and DFG entered into Amendment One to the 1986 agreement to offset direct losses of fish caused by the diversion of water by the Harvey O. Banks Delta Pumping Plant. In Paragraph 1. of Amendment One, the parties agreed to extend the period to expend the remainder of the \$15 million provided for fishery improvement projects to December 29, 2001. However, DWR and DFG will have spent only about \$10 million by that time. About \$5 million will not have been spent.
4. At the January 10, 2001, Delta Pumping Plant Fish Advisory Committee Meeting, committee members approved a three-year time extension through December 31, 2004, for expenditure of the remaining funds. Committee members have reviewed the draft of this Amendment Two and recommend that the Amendment be submitted to the Directors of DWR and DFG for signature.

AGREEMENT

The Department of Water Resources and the Department of Fish and Game agree to the following:

1. The period to expend the remainder of the \$15 million provided for fishery improvement projects is extended to December 31, 2004. The funds will be allocated as specified in Attachment 1 of this amendment, unless otherwise recommended by the Delta Pumping Plant Agreement Fish Advisory Committee and agreed to by the Department of Water Resources and the Department of Fish and Game.
2. This Amendment Two shall become effective upon signatures below and approval by the Department of General Services.


 Thomas M. Hannigan, Director
 Department of Water Resources

Date: 1-31-2002



Robert C. Hight, Director
 Department of Fish and Game

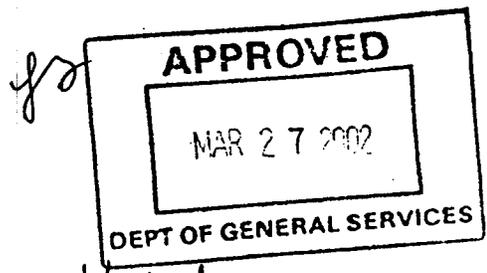
Date: 1-22-02

Attachment

Allocation of \$15 million account

Approved as to legal form and sufficiency:


 Asst. Chief Counsel, DWR



Kyatts

**DELTA PUMPING PLANT FISH PROTECTION AGREEMENT
\$15 MILLION LUMP SUM ACCOUNT**

Anticipated Allocation of Remaining Funds

<u>PROJECTS</u>	<u>AMOUNT FUNDED</u>	<u>COMPLETION DATE</u>
REMAINING ALLOCATIONS UNDER AMENDMENT ONE:¹		
Tuolumne River Salmon Restoration Center	\$ 147,000 ²	June 2003
Deer Creek Water Exchange Project	\$ 786,000	September 2004
San Joaquin Salmon Predator Isolation Projects	\$ 502,000	December 2004
	Subtotal \$ 1,435,000	
NEW ALLOCATIONS:		
Revised Deer Creek Water Exchange Project	\$ 950,000	September 2004
San Joaquin River Tributary Diversion Fish Screening	\$ 300,000	September 2004
Stanislaus River Spawning Habitat and Floodplain Restoration: Lover's Leap Reach	\$ 494,000	December 2004
Tuolumne River Channel Restoration Project, River Mile 43	\$ 301,000	December 2004
Tuolumne River, La Grange Gravel Addition, Phase II	\$ 433,000	September 2004
Merced River Salmon Habitat Enhancement, Expanded Western Stone Sites	\$ 1,105,000	June 2004
Merced River Wing Deflector Gravel Replenishment	\$ 68,000	June 2002
	Subtotal \$ 3,651,000	
TOTAL	\$5,086,000	

¹ Funding approved, but unexpended to date including encumbrances.

² Funds retained from initial project allocation to cover property management and disposition.

AMENDMENT THREE TO AGREEMENT BETWEEN
THE DEPARTMENT OF WATER RESOURCES AND
THE DEPARTMENT OF FISH AND GAME
TO OFFSET DIRECT LOSSES IN RELATION TO
THE HARVEY O. BANKS DELTA PUMPING PLANT

This Amendment Three is made by and between the Department of Water Resources (DWR) and the Department of Fish and Game (DFG) to amend their 1986 agreement (Agreement) to offset direct losses of fish caused by the diversion of water by the Harvey O. Banks Delta Pumping Plant.

Recitals:

1. On December 30, 1986, DWR and DFG entered into an agreement to offset direct losses of fish caused by the diversion of water by the Harvey O. Banks Delta Pumping Plant (Delta Pumping Plant) since 1986.
2. In Paragraph I.B. of the 1986 Agreement, the parties recognized that direct losses of fish for any given year would probably have been greater had there not been direct losses caused by the Delta Pumping Plant in previous years. DWR agreed to provide \$15 million for fishery improvement projects to offset these potentially higher losses. Paragraph D.4. required the \$15 million to be expended by December 29, 1996. However, DWR and DFG spent only about \$6 million by that time. About \$9 million was not spent.
3. On December 13, 1996, DWR and DFG entered into Amendment One to the 1986 Agreement to offset direct losses of fish at the Delta Pumping Plant. In Paragraph 1. of Amendment One, the parties agreed to extend the period to expend the remainder of the \$15 million provided for fishery improvement projects to December 29, 2001. DWR and DFG had spent only about \$10 million by that time. About \$5 million was not spent.
4. On January 31, 2002, DWR and DFG entered into Amendment Two to the 1986 Agreement. In Paragraph 1. of Amendment Two, the parties again agreed to extend the period to expend the remainder of the \$15 million provided for fishery improvement projects to December 31, 2004. DWR and DFG will have spent only about \$11.4 million by that time. About \$3.6 million will not have been spent.
5. At the March 4, 2004, Delta Pumping Plant Fish Advisory Committee Meeting, committee members approved another three-year time extension through December 31, 2007, for expenditure of the remaining funds, and requested that Amendment Three be submitted to the Directors of DWR and DFG for signature.

AGREEMENT

The Department of Water Resources and the Department of Fish and Game agree to the following:

1. The period to expend the remainder of the \$15 million provided for fishery improvement projects is extended to December 31, 2007. The funds will be allocated as specified in Attachment 1 of this amendment, unless otherwise recommended by the Delta Pumping Plant Agreement Fish Advisory Committee and agreed to by the Department of Water Resources and the Department of Fish and Game.
2. This Amendment Three shall become effective upon signatures below and approval by the Department of General Services.

Lester A. Snow, Director
Department of Water Resources

Ryan Broddrick, Director
Department of Fish and Game

Date _____

Date _____

Attachments:

1. Remaining allocation of \$15 million account

**DELTA PUMPING PLANT FISH PROTECTION AGREEMENT
\$15 MILLION LUMP SUM ACCOUNT**

Remaining Funds

<u>PROJECTS</u>	<u>AMOUNT</u> ¹	<u>COMPLETION DATE</u>
REMAINING ALLOCATIONS UNDER AMENDMENT ONE:		
Deer Creek Water Exchange Project	\$ 46,000	Dec 2007
San Joaquin Salmon Predator Isolation Projects	<u>\$ 313,000</u>	Dec 2007
	Subtotal \$ 359,000	
REMAINING ALLOCATIONS UNDER AMENDMENT TWO:		
Revised Deer Creek Water Exchange Project	\$ 950,000	Dec 2007
San Joaquin River Tributary Diversion Fish Screening	\$ 241,000	Dec 2007
Stanislaus River Spawning Habitat and Floodplain Restoration: Lover's Leap Reach	\$ 542,000	Dec 2007
Tuolumne River Channel Restoration Project, River Mile 43	\$ 279,000	Dec 2007
Tuolumne River, La Grange Gravel Addition, Phase II	\$ 276,000	Sep 2005
Merced River Salmon Habitat Enhancement, Expanded Western Stone Sites	\$ 922,000	Dec 2007
Merced River Wing Deflector Gravel Replenishment	<u>\$ 41,000</u>	Sep 2005
	Subtotal \$ 3,251,000	
TOTAL	\$3,610,000	

¹ Funding approved, but unexpended, including encumbrances through June 30, 2004.



DEPARTMENT OF WATER RESOURCES

1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

AUG 01 1995

Mr. Roger K. Patterson
Regional Director
Mid-Pacific Regional Office
Bureau of Reclamation
United States Department of the Interior
2800 Cottage Way
Sacramento, California 95825-1898

Dear Mr. Patterson:

Enclosed is your copy of the fully executed "Agreement Pursuant to Article VII Negotiations for Interim South Delta Facilities Concerning Fish in the Sacramento-San Joaquin Estuary."

If you need further information or would like to discuss this further, please call me at (916) 653-7007 or have your staff call Kathlin Johnson, Chief of the Department's Division of Planning, at (916) 653-1099.

Sincerely,

A handwritten signature in black ink, appearing to read "David N. Kennedy".

David N. Kennedy
Director

Enclosure

cc: Article VII Distribution List

Memorandum

Date : AUG 01 1995

To : Chuck Raysbrook
Interim Director
Department of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, California 95814

From : Department of Water Resources

Subject: Agreement Pursuant to Article VII

Enclosed is your copy of the fully executed "Agreement Pursuant to Article VII Negotiations for Interim South Delta Facilities Concerning Fish in the Sacramento-San Joaquin Estuary."

If you need further information or would like to discuss this further, please call me or have your staff call Kathlin Johnson, Chief of the Department's Division of Planning, at (916) 653-1099.



David N. Kennedy
Director
(916) 653-7007

Enclosure

cc: Article VII Distribution List

Article 7 - Distribution List

Steve Macaulay
State Water Contractors
555 Capitol Mall, Room 725
Sacramento, CA 95814

Dick Clemmer
Metropolitan Water District
P. O. Box 54153, Terminal Annex
Los Angeles, CA 90054

Thomas R. Hurlbutt
P. O. Box 877
Corcoran, CA 93212

Tom Clark
Kern County Water Agency
Box 58
Bakersfield, CA 93302-0058

Stanley M. Barnes
209 South Locust
Visalia, CA 93291

Tim Quinn
Metropolitan Water District
P. O. Box 54153, Terminal Annex
Los Angeles, CA 90054

Chuck Hanson
Hanson Environmental
500 Ygnacio Valley Rd., Suite 250
Walnut Creek, CA 94546

Gerald Meral
Planning and Conservation League
926 - J Street, Suite 612
Sacramento, CA 95814

Roger Wolcott
National Marine Fisheries Service
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95404

Alex Hildebrand
South Delta Water Agency
23443 South Hayes
Manteca, CA 95336

Pete Chadwick
Department of Fish and Game
4001 North Wilson Way
Stockton, CA 95205

Zeke Grader
Pacific Coast Federation of
Fishermen's Association
P. O. Box 989
Sausalito, CA 94966

John Beuttler
United Anglers
2530 San Pablo Ave., Suite D
Berkeley, CA 94710

Alice Low
Department of Fish and Game
4001 North Wilson Way
Stockton, CA 95205

Leroy Kennedy
Turlock Irrigation District
333 East Canal Drive
Turlock, CA 95381

Jason Peltier
CVP Water Users Association
1715 Capitol Avenue
Sacramento, CA 95814

Roger K. Patterson
U. S. Bureau of Reclamation
2800 Cottage Way
Sacramento, CA 95825

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Water Resources Management, Inc.
1851 Heritage Lane, Suite 172
Sacramento, CA 95815

James McKeivitt
U. S. Fish and Wildlife Service
2800 Cottage Way, Room E-1803
Sacramento, CA 95825

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Department of Fish and Game
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Stockton CA 95205

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Environmental Defense Fund
5655 College Avenue
Oakland, CA 94618

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Entrix
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Walnut Creek, CA 94596

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Modesto, CA 95352

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Striped Bass Association
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Glenn-Colusa Irrigation District
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Willows, CA 95988

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Westlands Water District
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San Luis and Delta Mendota
Water Authority
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Los Banos, CA 93635

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Lower Tule Irrigation District
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Woodville, CA 93258

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Tehama Colusa Canal Authority
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Willows, CA 95988

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Friant W.U.A.
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Lindsay, CA 93247

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Sacramento, CA 95825

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Griffith & Masuda
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Turlock, CA 95381

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2800 Cottage Way
Sacramento, CA 95825

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Sacramento, CA 95814

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Assistant General Manager
Santa Clara Valley Water District
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San Jose, CA 95118

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San Benito County WCD&FCD
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Hollister, CA 95024

Al Candlish
U. S. Bureau of Reclamation
2800 Cottage Way, Room W1413
Sacramento, CA 95825

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Central California Irr. Dist.
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Los Banos, CA 93635

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Visalia, CA 93278

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Division of Environmental Planning
and Management
State Lands Commission
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Sacramento, CA 95814

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Concord, CA 94524

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Contra Costa Water District
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Concord, CA 94524

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East Bay Municipal Utility District
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2800 Cottage Way
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Beak Consultants
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Stockton, CA 95205

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Department of Fish and Game
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Stockton, CA 95205

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Bay Institute
10 Liberty Ship Way, Suite 120
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Patrick Wright
Water Management Division (W-3)
U.S. Environmental Protection Ag.
75 Hawthorne Street
San Francisco, CA 94105

Anne Schneider
Grueneich, Ellison
and Schneider
2311 Capitol Avenue
Sacramento, CA 95816

Jean Elder
Regulatory Section, Room 6532
U. S. Corps of Engineers
650 Capitol Mall
Sacramento, CA 95814

John L. Winther, President
Delta Wetlands
3697 Mt. Diablo Blvd., Suite 120
Lafayette, CA 94549

Ted Roefs
U. S. Bureau of Reclamation
2800 Cottage Way
Sacramento, CA 95825

Austin Nelson
Contra Costa Water District
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Concord, CA 94524

Karen Garrison
Natural Resources Defence Council
71 Stevenson Street, Suite 1825
San Francisco, CA 94105

Jim Starr
Department of Fish and Game
4001 North Wilson Way
Stockton, CA 95205

Pat Brantley
Department of Fish and Game
4001 North Wilson Way
Stockton, CA 95205

The following have the same address:

A-43

Department of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

Dick Daniel
Terry Mills
Forrest Reynolds

G-8

State Water Resources Control Board
901 "P" Street
Sacramento, CA 95814

Richard Satkowski
Dave Beringer
Jim Sutton
Ron Bachman
Heidi Bratovich

Department of Water Resources
1416 Ninth Street
Sacramento, CA 95814

Dave Kennedy
Room 1115-1

Bob Potter
Room 1115-2

Katy Striemer
Room 1118-22

Larry Gage
Room 1618-37

Dave Anderson
Room 1118-10

Ed Huntley
Room 215-37

Fred Bachmann
Room 215-22

Karl Winkler
Room 215-36

Stein Buer
Room 215-26

Carroll Hamon
Room 1115-9

Kathlin Johnson
Room 252-9

George Barnes
Room 215-7

John Silveira
Room 1115-9

Chuck Vogelsang
Room 252-32

Mike Ford
Room 252-9

Paul Dabbs
Room 215-9

Claire LeFlore
Room 1118

Dick Buchan
Room 1115-16

Cathy Crothers
Room 1118

Susan Weber
Room 1118-20

Environmental Services Office
3251 "S" Street
Sacramento, CA 95816

Steve Ford
B-5

Randy Brown
Room 111

Ted Sommer
B-6

Agreement Pursuant to Article VII Negotiations
for Interim South Delta Facilities Concerning
Fish in the Sacramento-San Joaquin Estuary

I. Recitals

- A. This agreement is among the Department of Water Resources (DWR), the Department of Fish and Game (DFG), and the U.S. Bureau of Reclamation (USBR), pursuant to the terms and conditions of the "Framework of Process to Address Fish and Wildlife Impacts of the State Water Project and Central Valley Project in the Sacramento-San Joaquin Estuary" (Framework Agreement, see Appendix A), Article VII of the "Agreement Between the Department of Water Resources and the Department of Fish and Game to Offset Direct Fish Losses in Relation to the Harvey O. Banks Delta Pumping Plant" (1986 Agreement), and Article V of the "Agreement Between U.S. Bureau of Reclamation and the California Department of Fish and Game to Reduce and Offset Fish Losses Associated with the Operation of the Tracy Pumping Plant and the Tracy Fish Collection Facility" (1992 Agreement).
- B. Other agreements, laws, regulations, and policies that affect management of the Estuary and influence this agreement are:
1. The parties recognize that there are several processes through which regulatory agencies will require State Water Project (SWP) and Central Valley Project (CVP) operations be modified to offset the existing and unavoidable future impacts of the projects or to offset the impacts of other factors affecting the Estuary fish and wildlife resources. Among these processes are the State Water Resources Control Board's (SWRCB) promulgation of standards for the Estuary, the U.S. Environmental Protection Agency's approval of SWRCB standards or promulgation of federal standards, the U.S. Army Corps of Engineers' issuance of permits, consultations with the U.S. Fish and Wildlife and National Marine Fisheries Service under the Federal Endangered Species Act, and consultations with DFG under the California Endangered Species Act.
 2. On April 6, 1992, Governor Wilson announced his comprehensive water policy, which, in part, called for "immediate interim actions in the South Delta that will help restore the environment and improve the water supply", and "link South Delta facilities to improved, interim standards for protection of fish and

wildlife", (see Appendix B, Interim South Delta Facilities).

3. On August 2, 1994, all of the major State and federal agencies with responsibilities in the Sacramento-San Joaquin Estuary adopted the "Framework Agreement Between the Governor's Water Policy Council of the State of California and the Federal Ecosystem Directorate" (CALFED Framework Agreement, see Appendix C) for coordination of:
 - State and federal processes for setting water quality standards for the Bay-Delta Estuary.
 - Coordinating CVP/SWP operations with endangered species, water quality, and CVP Improvement Act requirements.
 - A joint State-federal process to develop long-term solutions for the problems affecting fish and wildlife, water supply reliability, flood control, and water quality in the Bay-Delta Estuary.
4. On December 15, 1994, State and federal agencies, urban and agricultural water users, and environmental interests signed "Principles for Agreement on Bay-Delta Standards Between the State of California and the Federal Government" (December 15 Agreement) for an interim Bay-Delta protection plan. Concurrently, the SWRCB issued a draft Water Quality Control Plan, embodying the same standards and measures.

II. Agreement

The parties agree to the following:

- A. The December 15 Agreement sufficiently addresses existing impacts in the Sacramento-San Joaquin Estuary to satisfy Article VII of the 1986 Agreement and Article V of the 1992 Agreement as they pertain to proceeding with the Interim South Delta Facilities.
- B. Any incremental impacts of the Interim South Delta Facilities will be addressed through environmental documentation and permitting processes, such as the National Environmental Policy Act, California Environmental Quality Act, Federal Endangered Species Act, and California Endangered Species Act.

- C. Any remaining obligations under Article VII of the 1986 Agreement and Article V of the 1992 Agreement will be addressed in agreements developed for a long-term solution for the Delta. The planning process for the long-term solution is presented in the CALFED Framework Agreement.
- D. If, after a long-term solution is implemented, project caused indirect effects on fish and wildlife still remain, these will be resolved through additional agreements pursuant to Article VII and Article V.
- E. Nothing herein precludes any party from any comment on the Interim South Delta Facilities during the environmental documentation and permitting process. Further, DWR and USBR shall incorporate appropriate mitigation measures in the project environmental document.
- F. This Agreement shall become effective when signed by the designated representatives for the parties hereto and shall remain in effect until terminated by mutual agreement of the parties.
- G. Amendments to this Agreement may be proposed by any party to this Agreement and shall become effective upon approval by all parties in writing.

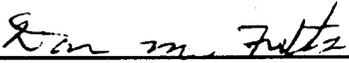
Approved:


Director
Department of Water Resources

Date 3-22-95

 3/28/95
Director
for Department of Fish and Game

Date _____


for Regional Director
U.S. Bureau of Reclamation

Date June 27, 1995

FRAMEWORK OF PROCESS TO ADDRESS FISH AND WILDLIFE IMPACTS OF THE
STATE WATER PROJECT AND CENTRAL VALLEY PROJECT IN THE
SACRAMENTO-SAN JOAQUIN ESTUARY¹

Introduction

- A. The Department of Fish and Game (DFG) and Department of Water Resources (DWR) entered into an agreement on December 30, 1986, entitled "Agreement Between Department of Water Resources and Department of Fish and Game to Offset Direct Fish Losses in Relation to the Harvey O. Banks Delta Pumping Plant".
- B. Article VII in the 1986 agreement specifies that the DWR will not increase the diversions beyond those set forth in the Corps of Engineers Public Notice 5820A, amended, dated October 31, 1981, until agreement is reached between DFG and DWR on offsetting those adverse fish impacts of the State Water Project (SWP) not already addressed in the 1986 agreement. Article VII also specifies that DFG shall not unreasonably withhold its approval of such an agreement.
- C. As a start towards satisfying their obligations under Article VII, DWR and DFG now wish to enter into this Framework Agreement.
- D. The U.S. Bureau of Reclamation (USBR) has determined that it is in its best interests to participate with DWR and DFG as a signatory to this Agreement. Activities taken pursuant to this Agreement may necessitate the inclusion of USBR and its Central Valley Project (CVP) facilities.
- E. Fish and wildlife populations in the Estuary are influenced by many complex interacting factors, including facilities and operations of the SWP and CVP. At the present time, this complexity makes it difficult to quantify the impacts of the SWP and/or the CVP on those populations.
- F. Because of the uncertainty of SWP/CVP impacts, the parties have chosen to take a negotiated approach to address these impacts. The intent of this approach is to ascertain and characterize factors adversely affecting fish and wildlife populations of the Estuary, regardless of cause or fault; to identify measures likely to avoid, eliminate, or offset those adverse impacts; and then to negotiate a proper, fair, and

¹ For purposes of this Agreement, the Sacramento-San Joaquin Estuary (Estuary) is the Delta as defined in Section 12220 of the California Water Code, Suisun Bay, San Pablo Bay, San Francisco Bay, and connecting waters.

reasonable share of those measures to be implemented by DWR and/or USBR in satisfaction of Article VII or for other purposes, and in compliance with relevant State and federal statutes including the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA). Such an approach does not necessitate the resolution of the uncertainties attending the identification of the precise SWP/CVP impacts on fish and wildlife resources, or the uncertainties attending the overall condition of these resources.

The parties agree to the following:

I. Purpose

The purpose of this Framework Agreement is to expedite the implementation of measures to avoid, eliminate, or offset identifiable problems affecting fish and wildlife resources in the Estuary by:

- A. establishing a comprehensive, fish and wildlife resource-oriented program as described in Article II of this agreement in which other parties may later participate; and
- B. providing a framework to guide negotiations towards one or more agreements as described in Article III to:
 1. avoid, eliminate, or offset SWP and/or CVP adverse impacts; and
 2. comply with the environmental requirements of future water management projects, including those related to CEQA and NEPA. The specific agreements will draw upon the information and measures developed under the comprehensive program.

II. Comprehensive Program

The Program will:

- A. Identify systemwide problems faced by fish and wildlife resources in the Estuary, regardless of nature or cause. Problems outside the Estuary will also be considered where such consideration is useful in understanding the relative importance of a problem, assuring that measures implemented do not adversely affect fish and wildlife resources outside the Estuary, and identifying offsite measures to alleviate problems not reasonably solvable in the Estuary. Exhibit 1 lists some of the problems to be addressed.

- B. Identify and evaluate measures that could solve the fish and wildlife problems, regardless of responsibility for those problems. Exhibit 2 lists some of the measures already identified that will be evaluated.
- C. Develop an implementation plan which shall include identification of needed authorizations and funding sources, a timetable for implementation, provisions for evaluating and, if needed, revising the Program as new information becomes available, and recruitment of other parties to participate in the implementation of the plan. In selecting measures to be included in the plan the following will be considered:
1. magnitude of potential benefits;
 2. likelihood of achieving the intended result;
 3. costs of a measure in relation to other measures and to its expected benefits;
 4. ability to evaluate the success of a measure;
 5. environmental considerations; and
 6. effect on other beneficial uses.

Priority will be given to measures which are designed to protect or improve fish habitat and which preserve the genetic diversity of fish stocks in preference to hatchery and stocking programs.

III. Negotiation Process

A. General Considerations

DWR, DFG, and USBR commit to the negotiation of an agreement or series of agreements designed to ultimately:

1. Eliminate or offset identified adverse impacts on the Estuary's fish and wildlife of existing SWP and CVP facilities and operations, other than losses of fish after they enter existing SWP and CVP intake facilities which have been or will be provided for in other agreements;
2. Avoid, to the extent feasible, the potential adverse impacts on the Estuary's fish and wildlife of future SWP and CVP facilities and operations, and offset unavoidable adverse impacts;

3. Provide for the future monitoring and evaluation of the effects of SWP and CVP facilities and operations on fish and wildlife in the Estuary; and for the implementation of measures to eliminate or offset adverse impacts as they are identified; and
4. Solve additional fish and wildlife problems in the Estuary which are not caused by SWP and CVP operations but are within the authority of the involved agencies and for which funding can be found.

Each agreement shall include a schedule for facility construction, operational changes, and other management measures. The facilities, operating criteria and management measures to be included in these agreements will be selected through the negotiation process and are not agreed upon now.

B. Specific Considerations

1. The negotiating process may consider other combinations of measures and facilities, but will initially consider measures that can be incorporated into the proposed South Delta Water Management Program and the proposed North Delta Water Management Program². Exhibit 3 lists measures to be considered for inclusion in the South Delta and North Delta Water Management Programs.
2. Each agreement will include provisions for continuing evaluation and, if needed, subsequent modification of the facilities or fish and wildlife protective measures. Consideration will be given to including specific provisions which provide for:
 - a. The continued evaluation of changes in biota of the Estuary, including those changes caused by the SWP and CVP. This evaluation will include experimental manipulation of project operations designed to test effects on fish and wildlife. The parties will seek

² For general descriptions of these two programs refer to the Department of Water Resources' Central District planning reports, South Delta Water Management Program, April 1988, and North Delta Water Management Program, March 1988.

to accomplish this evaluation through the Interagency Ecological Study Program for the Sacramento-San Joaquin Estuary.

- b. The modification of the agreement if resource protection goals are not achieved as expected, due to such things as unavoidable delays in construction, failures of operational measures or facilities to perform as expected, or unforeseen changes in the Estuary.
- c. The preparation of an annual report describing progress on the implementation of the agreements, status of fish and wildlife resources, results of studies to evaluate the status of resources, and changes needed to meet goals of the agreements.

IV. General Provisions

- A. Nothing in this agreement shall be construed as obligating any agency in the expenditure of funds or for the future payment of money. Such obligation will be described in any subsequent agreement(s) entered into as provided by this Agreement.
- B. Amendments to this Agreement may be proposed by any party to this Agreement and shall become effective upon approval by all parties in writing.
- C. Any party to this Agreement may withdraw and have no further obligation hereunder upon 120 days written notice to the other parties. The withdrawal of one party shall not terminate the rights and obligations of the remaining parties.
- D. All notices shall be mailed to each party to this Agreement.
- E. This Agreement shall become effective when signed by the designated representatives for the parties hereto and shall remain in effect until the program

implementation is completed or until terminated by mutual agreement of all of the parties.

APPROVED:



David N. Kennedy, Director
Department of Water Resources

Date: SEP 19 1990

APPROVED:



Peter F. Bontadelli, Director
Department of Fish and Game

Date: 10 - 9 - 90

APPROVED:



Lawrence F. Hancock
Regional Director
Mid-Pacific Region
U. S. Bureau of Reclamation

Date: 10/24/90

Fish and Wildlife Resource Problems

1. The adult population of striped bass in the Estuary has declined substantially.
2. Naturally spawned populations of chinook salmon in the Central Valley have declined since the early 1950's. Declines have been much greater in some parts of the system and for some races than others. (Note: Increased hatchery production has resulted in total populations remaining relatively stable.)
3. Naturally spawned populations of steelhead trout in the Central Valley have significantly declined. (Note: These reductions have only been partially offset by hatchery production.)
4. The American shad population has declined since the early 1900's, with pronounced declines having occurred in some parts of the system since the 1960's.
5. The populations of some native and other introduced resident fish in the Estuary have also declined.
6. The populations of some species of wildlife and the area of wetland and riparian habitat, including that of rare, endangered or threatened plants, have declined in the Estuary.
7. Populations of some lower trophic level organisms have declined in recent years.
8. Recent introductions of exotic species have caused undesirable changes in the estuarine community.

Measures to be Evaluated as Potential Solutions
to Fish and Wildlife Problems

Among the measures to be evaluated are:

1. Reducing water exports for specific periods to reduce diversion of juvenile salmon and other fish.
2. Increasing Sacramento River and San Joaquin River flows to improve the survival of juvenile salmon migrating through the Estuary.
3. Constructing a barrier at the head of Old River to improve the survival of juvenile salmon migrating through the Estuary.
4. Closing the Delta Cross Channel gates for specific periods in the spring to reduce diversion of juvenile salmon and striped bass eggs and larvae from the Sacramento River into the interior Delta.
5. Improving regulations and/or enforcement procedures to better protect fishery resources in conjunction with other measures.
6. Using Delta outflow to position the entrapment zone in Suisun Bay to improve habitat conditions for juvenile striped bass and other fish.
7. Reducing discharges of toxic substances into and upstream of the Estuary to improve the survival and health of the estuarine biota.
8. Controlling the introduction of new species into the Estuary to prevent interspecific competition and predation detrimental to desirable species.
9. Changing SWP and/or CVP operations to speed fish outmigration through the Estuary to increase survival of juvenile salmon.
10. Installing and monitoring the effects of temporary barriers to increase the survival of juvenile salmon and other fish.
11. Relocating and consolidating Delta diversions to reduce fish entrainment losses.

12. Transporting juvenile salmon by truck or barge from the Sacramento River above the Delta to various downstream release sites to improve survival.
13. Eliminating or reducing reverse flows in Delta channels to reduce entrainment of fish in export pumps and improve migrations of anadromous fish through the Delta.
14. Installing fish screens on the Contra Costa Canal, agricultural, and/or other Delta diversions to reduce fish losses.
15. Expanding artificial production to increase fish populations.
16. Gating and closing Georgiana Slough for specific periods to reduce diversion of juvenile salmon and striped bass eggs and larvae into the interior Delta.
17. Developing and installing a device to divert juvenile salmon from the Sacramento River into Sutter and/or Steamboat Slough(s) to improve survival.
18. Constructing a new channel with an appropriate fish screen to connect the Mokelumne River and the Sacramento River and close the Delta Cross Channel to reduce diversion of juvenile salmon and other fish into the interior Delta.
19. Enlarging cross sections of Delta water transfer channels to reduce water velocities to improve conditions for resident fish and benthic organisms.
20. Constructing an isolated water transfer facility to reduce the entrainment of fish in the export pumps, improve the productivity of the interior Delta, and reduce straying of downstream migrating anadromous fish.
21. Constructing new or additional fish screens to improve the survival of fish drawn into SWP and/or CVP intakes.
22. Reconfiguring the intake systems for the SWP and/or CVP to improve survival and reduce the number of fish drawn into the intakes.
23. Identifying optimal stocking locations and other measures to improve survival of hatchery-reared striped bass.

24. Reducing predation in Clifton Court Forebay to improve survival of fish.
25. Rehabilitating existing seasonal and permanent wetlands and developing new seasonal and permanent wetlands to increase wildlife populations.
26. Increasing Delta outflow to protect fishery resources and their food supplies downstream of Chipps Island.
27. Augmenting Delta inflow during the spring to increase American shad production.
28. Augmenting Delta outflow to protect tidal marshes.

Fish and Wildlife Protection Measures to be Considered
for the Proposed South Delta and
North Delta Water Management Programs

A. Among the measures to be considered in the South Delta Water Management Program are:

1. Install barriers in South Delta channels for specific periods in the spring and fall to improve downstream and upstream migration of salmon in the San Joaquin River and to improve water quality for fish.
2. Modify the intake system and fish screens at the SWP and CVP Delta diversion facilities to reduce losses of fish.
3. Release water from New Melones Reservoir to improve water quality for fish in the South Delta and improve flows for fish in the Stanislaus River and the San Joaquin River.
4. Modify South Delta channels to provide flexibility to change project operations to reduce entrainment of fish at the SWP/CVP pumping plants and improve fish habitat.
5. Modify limitations on SWP and CVP exports to reduce numbers of fish drawn into the export facilities and improve fish habitat.
6. Change minimum Delta outflows to improve fishery habitat in the Estuary.
7. Remove predators from Clifton Court Forebay to improve survival of fish.
8. Release of pulses of water in the Sacramento and San Joaquin Rivers to improve transport of juvenile striped bass and outmigration of salmon.
9. Close the Delta Cross Channel gates for specified periods in the spring to improve transport of juvenile striped bass and outmigration of salmon.

B. Among the measures to be considered for the first phase of the North Delta Water Management plan are those identified but not selected above, and:

1. Increase the capacity of the Mokelumne River and modify SWP and CVP operations to reduce the frequency and magnitude of reverse flow in the lower San Joaquin River.
 2. Modify the Delta Cross Channel gates to facilitate regulation of diversion of water and fish through the Cross Channel.
 3. Construct facilities to divert juvenile salmon from the Sacramento River into Sutter and/or Steamboat Slough(s) to improve survival.
 4. Develop fish screens to incorporate into a second phase of the North Delta Water Management Program.
 5. Transport juvenile salmon by truck or barge from the Sacramento River above the Delta to various downstream release sites to improve survival.
- C. Among the measures to be considered for incorporation into later phases of the North Delta Water Management Program are those identified and not selected above, and:
1. Constructing and screening a new channel connecting the Sacramento River and the Mokelumne River;
 2. Closing the Delta Cross Channel; and
 3. Gating and closing or restricting flows into Georgiana Slough.

Appendix B

INTERIM SOUTH DELTA FACILITIES

The Interim South Delta Program facilities consist of measures to improve operational flexibility and yield of the State Water Project, improve water levels and circulation for local agricultural diverters, and reduce fishery impacts. The components of the preferred alternative are:

Construction of an Additional Forebay Intake Structure

A multi-gate intake structure is proposed for the northeastern corner of the existing Clifton Court Forebay near the confluence of Old River and Victoria and North Canals (Figure 1). This additional intake structure will facilitate diversions into Clifton Court Forebay in amounts that will support the full pumping capability of Banks Pumping Plant. It will be operated according to tidal water elevations to increase peak forebay diversions from 12,000 cfs to more than 25,000 cfs for short periods. The existing gate structure, located at the southeastern corner of the Forebay, will be kept operable.

Limited Channel Dredging

It will be necessary to increase the existing channel capacity by dredging in the reach of Old River from the Western Canal to the confluence of Old River and North Victoria Canal to allow the diversions during high flow periods necessary to support the full pumping capability of Banks Pumping Plant. Approximately 1.25 million cubic yards of material will be dredged from a 4.9-mile reach of Old River to increase the channel capacity north of the new intake. The existing channel will be dredged to increase the average channel depth no greater than five feet.

Increase Diversions into Clifton Court Forebay

DWR proposes to increase diversions into Clifton Court Forebay via the existing and proposed intake structures such that the diversions into the Forebay shall not exceed, on a monthly averaged basis, 20,430 acre-feet per day for any given month. Based on model studies which DWR has conducted to date, the increased rate of diversion into the Forebay will utilize the full pumping capability of the existing Banks Pumping Plant. This action will require that the U.S. Army Corps of Engineers revise the present conditions contained in Public Notice 5820-A and issue a permit under Section 10 of the Rivers and Harbors Act allowing for such diversions. All diversions will continue to be subject to compliance with other existing constraints governing the operation of the SWP, such as SWRCB water rights decisions and applicable federal and State laws (i.e., the Endangered Species Act and Clean Water Act).

Fish Barrier

A proposed barrier will operate seasonally in both the spring and fall to improve fishery conditions for salmon migrating along the San Joaquin River. The barrier will be constructed at the confluence of the head of Old River and the San Joaquin River. The structure will be concrete with vertical lift gates, boat docking facilities, and a jib crane. The jib crane will be used to transfer boats from one side to the other via a sling apparatus when the gates are in place. This structure will only be operated during the spring and fall periods of each year. During other times of the year, the gates will remain fully raised.

Flow Control Structures

Flow control structures are proposed for three locations: Middle River, Grant Line Canal, and Old River east of the Delta Mendota Canal. These flow control structures will improve water levels and circulation in the south Delta.

The Middle River structure will be located on Middle River, near the confluence of Middle River, North Canal, Victoria Canal and Trapper Slough, approximately 13 miles east of Stockton. This barrier will consist of two radial gates housed in a reinforced concrete gate bay structure and a boat ramp. The boat ramp will be used to transfer boats and people across the structure.

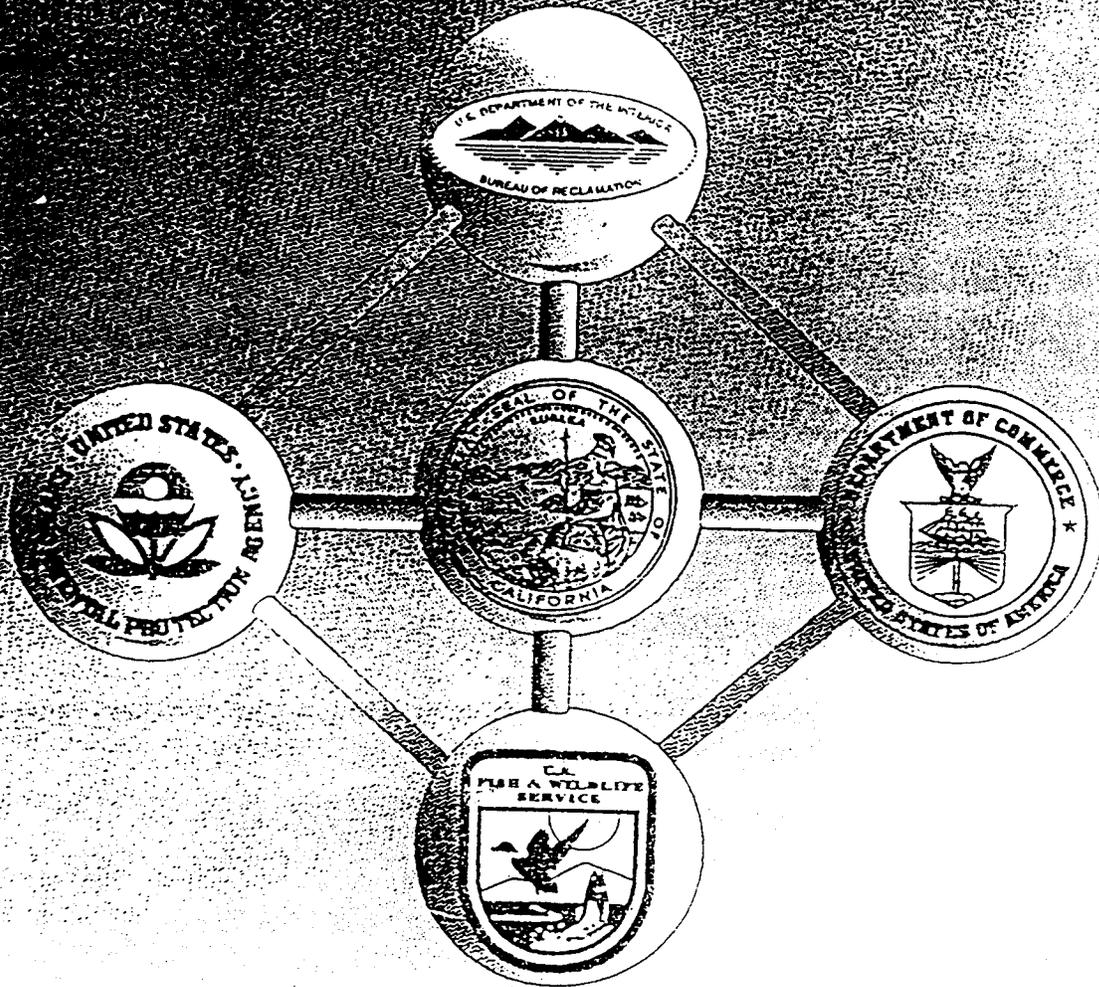
The Grant Line Canal and Old River flow control structures are very similar in design. Grant Line Canal barrier will be located at the confluence of Grant Line Canal and Old River. The Old River structure, east of the Delta Mendota Canal, will be approximately 4,000 feet southeast of the intersection of the Alameda, Contra Costa, and San Joaquin County lines. The two barriers will consist of concrete control structures with radial gates. A 50-foot-wide by 105-foot-long boat lock will also be included in each structure.

All of the flow control structures will be operated during the agricultural irrigation season only, to tidally pump water from the northwest direction to the southeast. The radial gates will be raised when the water level is rising according to the tide. When the tide reverses and water levels begin to drop, the gates will be lowered to capture the water.

Mitigation Measures

In addition to this agreement, concurrent actions will be undertaken in connection with the EIR/EIS process and existing consultation and conferencing for sensitive species and adopted biological opinions. Mitigation measures for impacts in addition to the fishery, such as any terrestrial impacts, also will be addressed in the EIR/EIS.

APPENDIX C



FRAMEWORK AGREEMENT

FRAMEWORK AGREEMENT

BETWEEN THE GOVERNOR'S WATER POLICY COUNCIL OF THE STATE OF CALIFORNIA AND THE FEDERAL ECOSYSTEM DIRECTORATE

This Memorandum of Agreement (Agreement) is entered into between the Governor's Water Policy Council of the State of California (Council) and the Federal Ecosystem Directorate (FED). The purpose of the Agreement is to establish a comprehensive program for coordination and communication between the Council and the FED with respect to environmental protection and water supply dependability in the San Francisco Bay, Sacramento-San Joaquin Delta Estuary and its watershed (Bay-Delta Estuary). In particular, this Agreement is intended to provide for increased coordination and communication with respect to:

- Substantive and procedural aspects of water quality standard setting;
- Improved coordination of water supply operations with endangered species protection and water quality standard compliance; and
- Development of a long-term solution to fish and wildlife, water supply reliability, flood control, and water quality problems in the Bay-Delta Estuary.

RECITALS

1. The Agreement set forth in this document is in acknowledgement of the critical importance of the Bay-Delta Estuary to the natural environment and economy of California, in recognition of the multiple, complex resource management decisions that must be made to stabilize, protect, restore, and enhance the Bay-Delta Estuary, and in appreciation of the close interconnection of Federal and State interests and responsibilities in the Bay-Delta Estuary.

2. In April 1992, Governor Pete Wilson announced a comprehensive water policy for the State of California. That policy was aimed at meeting the needs of all the State's water users for safe, reliable water supplies while mitigating for past water-related harms to fish and wildlife and restoring and maintaining fish and wildlife populations and habitat. Governor Wilson placed special emphasis on solving the problems of the Bay-Delta Estuary, recognizing it as "the centerpiece of California's most intractable water problem."

3. As part of his policy, the Governor announced that he would appoint an Oversight Council to help guide the State's long-term planning and decision-making process.

On December 9, 1992, the Governor created the Bay-Delta Oversight Council (BDOC) and directed it to develop a comprehensive program to protect and enhance the Bay-Delta Estuary by addressing water quality issues, design and operation of water export systems, levee and channel maintenance, and means of protecting the Bay-Delta Estuary and its fish and wildlife resources. He proposed using the California Environmental Quality Act (Cal. Pub. Res. Code § 21000 *et seq.*) and the National Environmental Policy Act NEPA (42 U.S.C. § 4321 *et seq.*) as the planning framework for the decision-making process.

4. Also on December 9, 1992, Governor Wilson created the California Water Policy Council consisting of representatives of eight State departments and agencies with responsibilities for implementing State water policy. Governor Wilson charged the Council with sharing information and coordinating activities related to the State's long-term water policy.

5. The Governor's water policy also directed the State Water Resources Control Board (SWRCB) to work closely with the U.S. Environmental Protection Agency (EPA) to develop interim water quality standards for the Bay-Delta Estuary. The SWRCB released a draft interim water right decision in December 1992, but subsequently withdrew it. On March 25, 1994, the SWRCB announced plans to hold additional workshops, and to prepare a draft water quality control plan for release in December 1994.

6. On September 10, 1993, the U.S. Bureau of Reclamation (USBR), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS) and EPA signed an Agreement for Coordination creating the Federal Ecosystem Directorate with the goal of coordinating Federal resource protection and management decisions in the Bay-Delta Estuary and its watershed. Federal responsibilities affecting the Bay-Delta Estuary include listing species as threatened or endangered and conducting consultations under the Federal Endangered Species Act, implementing the Central Valley Project Improvement Act (CVPIA) (Public Law 102-575, Title XXXIV), operating the Central Valley Project, reviewing and, where necessary, promulgating water quality standards under the Clean Water Act (33 U.S.C. § 1251 *et seq.*), and reviewing water development proposals under the Fish and Wildlife Coordination Act (16 U.S.C. § 661 *et seq.*), NEPA, Section 404 of the Clean Water Act (33 U.S.C. § 1344), and the Rivers and Harbors Act (33 U.S.C. § 401 *et seq.*). The Agreement for Coordination also states the Federal agencies' commitment "to work closely with all involved agencies of the State of California and the Federal government so that, to the greatest extent possible, our implementation of Federal law in the Bay-Delta Estuary complements the State's role in allocating water resources and the State's continuing efforts to preserve, protect, and enhance the natural resources of the estuary."

7. On December 15, 1993, the FED announced a series of coordinated actions and proposals to protect the fish and wildlife resources of the Bay-Delta Estuary. These included EPA's proposed water quality standards under the Clean Water Act, USFWS and NMFS actions to protect winter-run salmon, delta smelt and Sacramento splittail under the Endangered Species Act (ESA) (16 U.S.C. § 1531 *et seq.*), and USFWS and USBR proposals under the CVPIA.

8. Additional water management and resource protection and management actions by State and Federal agencies with responsibility in the Bay-Delta Estuary will be required over the next several years. Close coordination between affected State and Federal agencies is desirable to achieve regulatory consistency and certainty and provide environmental protection in a manner which minimizes impacts on the State's economy and water resources.

9. There are three areas in which Federal-State coordination and cooperation with respect to the Bay-Delta Estuary are particularly important:

a. **Water Quality Standards Formulation.** Under the Federal Clean Water Act and the State of California's Porter-Cologne Act (Cal. Water Code § 13000 *et seq.*), the SWRCB and the EPA have complementary and closely related roles with respect to formulation of water quality standards for the Bay-Delta Estuary. Therefore, coordination between EPA and SWRCB is vital if adequate Bay-Delta protections are to be achieved and maintained.

b. **Coordination of Federal and State Project Operations with Regulatory Requirements.** There are numerous hydrological, contractual, and operational connections between the Federal Central Valley Project (CVP) and the State Water Project (SWP). These include the Coordinated Operation Agreement, approved by Congress in 1986 (Public Law 99-546); joint obligations to meet State water quality standards, State water rights permits, and Federal and State endangered species requirements; and joint ownership and operation of San Luis Reservoir and San Luis Canal (the Joint-Use Facilities). The projects face a shared challenge in reconciling operational requirements with current and future statutory and regulatory requirements, particularly those relating to endangered species and water quality. Close coordination is necessary to identify operational issues related to statutory and regulatory compliance and to provide a forum for addressing problems and issues promptly as they arise.

In recognition of the complexity of fishery, habitat, water quality, and hydrodynamic issues confronting resource managers in the Bay-Delta Estuary, State and Federal agencies have participated for several years in the scientific study effort known as the Interagency Ecological Program (IEP). The IEP serves as an example of State-Federal cooperation in the Bay-Delta Estuary. The IEP data base and its programs provide a valuable source of scientific information as efforts are made to coordinate operational requirements with regulatory compliance.

c. **Long-Term Bay-Delta Solution.** State and Federal interests and responsibilities in the Bay-Delta Estuary are inextricably intertwined in the areas of fish and wildlife protection and enhancement, water quality protection, flood control, and water supply project operation. There is a shared State-Federal interest in pursuing long-term solutions that adequately address the multiple environmental, economic, and water supply interests in the Bay-Delta ecosystem. Federal and State agencies with responsibilities in the Bay-Delta Estuary must participate. Neither the Federal nor the State government, acting alone, can accomplish this vital task.

AGREEMENT

The Council and the FED agree as follows:

1. We commit to promoting maximum coordination, communication, and cooperation among the State and Federal agencies with interests and responsibilities in the Bay-Delta Estuary within the limits of existing law.

2. We commit to meeting the requirements of State and Federal law in a manner that considers how the overall costs in water and dollars for achieving environmental protection can be minimized.

3. We agree that a major goal of all State and Federal regulatory processes affecting the Bay-Delta Estuary should be to provide meaningful regulatory stability for beneficial uses of the Bay-Delta Estuary's resources. We believe that the best means to this goal is to develop a single, cohesive program consisting of water quality standards and other appropriate actions that meet all requirements of State and Federal law and which will remain in effect, absent unforeseen circumstances, for a period of years.

4. We agree that a primary component of providing regulatory stability is to integrate current and future implementation of the Federal and State Endangered Species Acts into a coordinated approach to resources management in the Bay-Delta Estuary. This can best be accomplished by taking a comprehensive ecosystem approach to the problems of the Bay-Delta Estuary.

5. We agree that it is essential for the State and Federal agencies with regulatory and resources management responsibilities in the Bay-Delta Estuary to reach consensus, consistent with applicable procedural limitations, on the appropriate level of protection to be achieved for the Bay-Delta Estuary.

6. We agree to quarterly joint meetings between the membership of the Council and the FED to discuss resources management issues of mutual concern in the Bay-Delta Estuary, and to evaluate the progress being made in the areas of water quality protection, restoration of ecosystems, operations coordination, and development of a long-term Bay-Delta Estuary solution.

7. We agree that the Interagency Ecological Program will be used as one of the sources of technical support for State-Federal cooperative efforts in the Bay-Delta Estuary.

8. We endorse and concur with the points of agreement attached to this Framework Agreement and incorporated in it by this reference as Exhibits A, B, and C, dealing respectively with:

- State and Federal Processes for Setting Water Quality Standards for the Bay-Delta Estuary

- **Coordinating CVP/SWP Operations With Endangered Species, Water Quality, and CVPIA Requirements**
- **A Joint State-Federal Process to Develop Long-term Solutions for the Problems Affecting Public Values in the Bay-Delta Estuary.**

9. We recognize that as public agencies we each have specific statutory and regulatory authority and responsibilities, and that our actions must be consistent with applicable procedural and substantive requirements. This Agreement is intended to be in furtherance of the agencies' discharge of their respective authority and responsibilities, and its provisions are to be interpreted and implemented accordingly. Nothing in this Agreement is intended to or shall have the effect of constraining or limiting the agencies in carrying out their statutory responsibilities. Nothing in this Agreement constitutes an admission by any party as to the proper interpretation of any provision of law, including, without limitation, Clean Water Act Sections 101(g) and 303, nor is anything in this Agreement intended to, nor shall it have the effect, of waiving or limiting any party's rights and remedies under any applicable law.

UNITED STATES OF AMERICA

Elizabeth Ann Rieke

Elizabeth Ann Rieke
Assistant Secretary for Water and Science
Department of the Interior

June 30, 1994

Dated

Roger K. Patterson

Roger K. Patterson
Regional Director
U.S. Bureau of Reclamation

7/19/94

Dated

George T. Frampton, Jr.

George T. Frampton, Jr.
Assistant Secretary for Fish and Wildlife
and Parks, Department of the Interior

July 7, 1994

Dated

Michael J. Spear

Michael J. Spear
Regional Director
U.S. Fish and Wildlife Service

7/28/94

Dated

Bob Perciasepe

Robert Perciasepe
Assistant Administrator for Water
Environmental Protection Agency

7-8-94

Dated

Felicia Marcus

Felicia Marcus
Regional Administrator
Environmental Protection Agency

8/2/94

Dated

Douglas K. Hall

Douglas Hall
Assistant Secretary for Oceans
and Atmosphere, Department of Commerce

July 15, 1994

Dated

Rodney R. McInnis

Rodney R. McInnis
Acting Regional Director
National Marine Fisheries Service

7-29-94

Dated

STATE OF CALIFORNIA



Douglas P. Wheeler
Secretary, California Resources Agency
Chair, California Water Policy Council

7-1-94

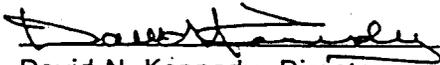
Dated



Boyd Gibbons, Director
California Department of Fish and Game

6/30/94

Dated



David N. Kennedy, Director
California Department of Water Resources

6-29-94

Dated



John J. Amodio, Executive Officer
California Bay-Delta Oversight Council

6-30-94

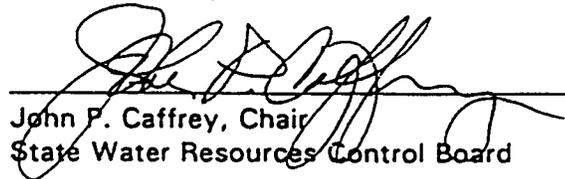
Dated



James M. Strock
Secretary for Environmental Protection
California Environmental Protection Agency

July 5, 1994

Dated



John P. Caffrey, Chair
State Water Resources Control Board

6-30-94

Dated

POINTS OF AGREEMENT
ON
STATE AND FEDERAL PROCESSES FOR SETTING
WATER QUALITY STANDARDS FOR THE BAY-DELTA ESTUARY

1. EPA has proposed and received public comments on draft water quality standards for the Bay-Delta Estuary pursuant to Section 303(c)(3) and 303(c)(4) of the Clean Water Act (33 U.S.C. § 1313(c)(3), (4)). EPA will take final action on the proposed standards by December 15, 1994. These standards are intended to supersede and supplement 1991 SWRCB standards disapproved by EPA relating to estuarine habitat and other fish and wildlife uses of the Bay-Delta Estuary. Upon its approval of State-submitted standards meeting the requirements of the Clean Water Act, EPA will initiate necessary rulemaking action, consistent with the Clean Water Act, to withdraw the Federal standards. Prior to any action on State-submitted standards, EPA will consult with USFWS and NMFS as required by Section 7 of the Federal Endangered Species Act (16 U.S.C. § 1536).

2. Commencing with workshops in April 1994, SWRCB will update and revise its 1991 Water Quality Control Plan for the Bay-Delta Estuary, including revision of the State standards to meet Federal Clean Water Act requirements, and will release a new draft Plan by December 1994. The workshops will solicit comments and recommendations from interested parties on the scope of the review, the level of protection that should be provided to fish and wildlife beneficial uses, the alternatives available to achieve that level of protection, and related issues.

3. The results of this process will be used to prepare a draft water quality control plan and an evaluation of the environmental and economic effects of the draft plan and its alternatives pursuant to all applicable provisions of the California Water Code, the Federal Clean Water Act, and the California Environmental Quality Act (CEQA). A hearing will be held approximately 60 days after the release of the draft plan to solicit comments on the draft plan. The SWRCB will then consider adoption of the draft plan at a subsequent public meeting. After adoption of the plan and its approval by the California Office of Administrative Law (OAL), the new or revised water quality standards contained in the plan that are subject to Federal authority will be submitted to EPA for its review and approval.

4. The SWRCB will initiate a water right proceeding for the purpose of allocating responsibility to comply with water quality standards meeting the requirements of the Clean Water Act among the water right holders in the Bay-Delta watershed and to establish terms and conditions in appropriate water right permits. A CEQA document (probably an EIR) will be prepared before adoption of a water right decision.

5. The SWRCB will seek agreement with the California Department of Water Resources and the U.S. Department of the Interior to operate the SWP and CVP to make an equitable contribution to meeting the standards, starting in calendar year 1995, while the

SWRCB is working on a water rights decision to equitably allocate responsibility among water right holders in the Bay-Delta watershed.^{1/}

6. The time schedule for these State Board activities is provided below.

- March 1994 Distribute workshop notice initiating review of the water quality control plan

- April-July 1994 Conduct workshops to receive input on the 1994 following subjects, and possibly others:
 - April - - EPA/Federal Ecosystem Directorate proposed standards
 - Level of protection necessary for the Bay-Delta Estuary

 - May - - ESA issues
 - Western Delta industrial diversions
 - Other Delta diversions
 - Striped bass

 - June - Exotic species
 - Fishery declines from other causes
 - Operations by CVP/SWP for ESA and other species of concern
 - Effects of projects other than SWP/CVP

 - July - Potential methods of economic analysis
 - Recommendations for alternative standards
 - Interim implementation of standards by SWP/CVP during 1995 and until water rights decision is implemented

- July-November 1994 Analyze data and write draft Water Quality Control Plan

- December 1994 - Release draft Water Quality Control Plan and Notice of Hearing to Consider Plan
- Negotiate agreements for compliance with draft standards during 1995 and until water rights decision is implemented (see footnote #1)

- January 1995 Commence SWP/CVP operations under interim compliance standards^{2/}

1. It may be possible for the standards to be phased, with the initial phase implemented by the projects during the water rights hearings. Compliance with Endangered Species Act requirements affecting the Bay-Delta may result in actions which contribute to or result in meeting the standards' initial phase.

2. Because of procedural complexities and numbers of diversions affected, the water rights process could take up to two years to complete.

- February 1995 Conduct Water Quality Control Plan hearing
- March 1995 Adopt Water Quality Control Plan
- June 1995 Commence water rights process

**POINTS OF AGREEMENT
ON
COORDINATING CVP/SWP OPERATIONS WITH
ENDANGERED SPECIES, WATER QUALITY, AND CVPIA REQUIREMENTS**

1. Listing of the winter-run Chinook salmon and delta smelt under the State and Federal Endangered Species Acts has resulted in biological opinions by NMFS, USFWS and the California Department of Fish and Game (DFG) containing constraints on CVP and SWP operations. Additional listing of other species, such as the Sacramento splittail, could require additional constraints on project operations.
2. The 1993 winter-run Chinook salmon biological opinion issued by NMFS and adopted by DFG includes a reasonable and prudent alternative (RPA) and incidental take statement that set requirements for Sacramento River flows and temperature, Delta Cross-Channel gate operation, Delta channel flows, SWP-CVP coordination and cooperation, take limits, carry-over storage requirements at Shasta Reservoir, operation restrictions at Red Bluff Diversion Dam, monitoring and studies, and creation of a monitoring work group and an operations and management work group to coordinate implementation of the RPA.
3. The 1994 delta smelt biological opinion issued by USFWS and under consideration for adoption by DFG includes an RPA and incidental take statement that set requirements for transport and habitat flows, San Joaquin River transport flows, late spawning protection, Suisun Marsh salinity control structure operation, SWP-CVP coordination and cooperation, take limits, monitoring and studies, and provide for creation of a working group and a management group to coordinate implementation of the RPA.
4. A high level of coordination by resource managers, water operators, and biologists is needed to provide comprehensive and effective implementation of the complex requirements for resource protection affecting Bay-Delta resources and the CVP and SWP operations.
5. A CVP/SWP Operations-Endangered Species Coordination Group ("Coordination Group") shall be established consisting of representatives of USFWS, USBR, NMFS, EPA, DFG, DWR, and staff of the SWRCB. The Coordination Group will exchange information and facilitate the coordination of water project operations with requirements of the RPAs under the winter-run salmon and the delta smelt biological opinions, the State and Federal water quality standards, and the CVPIA.
6. Issues that may be presented within the Coordination Group include:
 - Review of project operations;
 - Review of operating parameters in biological opinions;

- Review of fish distribution and fish population levels;
- Review of status of endangered species take;
- Review of fish identification procedures;
- Discussion of strategies for implementation of fishery protections to resolve conflicts between operations, water quality requirements, and fishery needs in the Bay-Delta Estuary and its watershed;
- Coordination of the winter-run salmon monitoring and operations and management work groups with the delta smelt management and work groups and with the Interagency Ecological Program;
- Discussion of strategies for implementation of Bay-Delta Estuary standards;
- Review of and comment on the annual CVPIA water allocation and on other CVPIA activities related to the Bay-Delta Estuary such as the Anadromous Fish Restoration Program; and
- Cooperation with the Interagency Ecological Program as well as others to determine factors affecting Delta habitat and health of fisheries, and to identify appropriate corrective measures for the CVP and SWP.

7. The Coordination Group shall meet as necessary to accomplish the purposes of this Agreement.

8. The Coordination Group shall periodically provide briefings on its reviews, recommendations, and activities to the Governor's Water Policy Council and the FED. The Coordination Group shall also provide periodic briefings to other interested parties.

**POINTS OF AGREEMENT
ON
DEVELOPMENT OF JOINT STATE-FEDERAL PROCESS TO
DEVELOP LONG-TERM SOLUTIONS
FOR THE PROBLEMS AFFECTING PUBLIC VALUES
IN THE BAY-DELTA ESTUARY**

To secure California's water future, the Council and the FED commit to work together to equitably reconcile the economic and environmental values that are dependent on the Bay-Delta Estuary consistent with achieving and maintaining statutory objectives.

The Council and the FED are committed to the principles detailed herein. Taken together, they provide a foundation for a joint process to develop a long-term solution for the problems affecting public values in the Bay-Delta Estuary. The process will be assisted by citizen-advisors gathered from California's agricultural, environmental, urban and other affected interests. The process will be administered through cooperative and coordinated activities of responsible State and Federal agencies, will incorporate full and coordinated compliance with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA), and will ensure maximum opportunities for public involvement.

The Council and the FED jointly commit to the following:

1. Alternative solutions will be evaluated to address the underlying causes of problems affecting the Bay-Delta Estuary's public values. These values include:

- A. Water quality
- B. Guarantees for protection of the Bay-Delta Estuary and its fish and wildlife resources
- C. Effective planning and operation of water export systems
- D. Maintenance of Delta levees and channels

2. The Public will have a central role. A committee of citizen-advisors, representing California's agricultural, environmental, urban and other affected interests will be created to advise the responsible agencies. This committee will meet the requirements of applicable State and Federal laws. It will include existing members of the State's Bay-Delta Oversight Council as appropriate, with additional appointments as needed to ensure balanced representation. Activities of the citizen-advisors include:

- A. Recommend objectives to be met, including both the problems to be addressed and a specific set of objectives.

B. Recommend neutral evaluation criteria to measure the effectiveness of alternative solutions consistent with statutory and regulatory authorities.

C. Recommend specific solution alternatives to be evaluated in a formal CEQA/NEPA process carried out by one or more agencies.

D. As part of the CEQA/NEPA environmental documentation process, recommend the best solution alternative for implementation by the appropriate agencies.

3. The State and Federal agencies will coordinate the joint comparative evaluation within the CEQA/NEPA framework. To assure thoroughness, objectivity, and credibility, the comparative evaluation of selected solution alternatives will be conducted within the CEQA/NEPA framework. This will ensure that all reasonable alternatives will be fully and fairly considered, and that formulation of the solution alternatives and the detailed study of them will occur in an open forum.

4. The State and Federal Agencies agree to coordinate and cooperate in the joint management of the solution-finding process. The Agencies also commit to the provision of information to the citizen advisory committee. The Bay-Delta solution-finding process will also utilize the ongoing Interagency Ecological Program as an additional source of appropriate technical support.

5. The Bay-Delta solution-finding process will be linked to the Central Valley Project Improvement Act and other ongoing processes. The CVPIA is major legislation influencing the management of the CVP, the single largest source of developed water in California. Management of the CVP is linked to operation of the State Water Project through the Coordinated Operation Agreement, through operation of Joint Use Facilities, and through joint obligations to meet water quality standards and endangered species requirements. There is a long history of joint planning and cooperation between the State and Federal governments regarding operations in the Delta. Where appropriate, implementation of the CVPIA and the Bay-Delta Estuary solution-finding processes will be closely coordinated to support and complement one another.

Finally, similar coordination will be developed between the Bay-Delta solution-finding process and other existing State and Federal programs focused on the Bay-Delta Estuary.

6. Implementation. The State and Federal agencies commit to develop as soon as practicable such details as are necessary to commence joint management of the long-term solution-finding process. In the interim, the FED agrees to cooperate, as appropriate, with the State's current long-term solution finding process.